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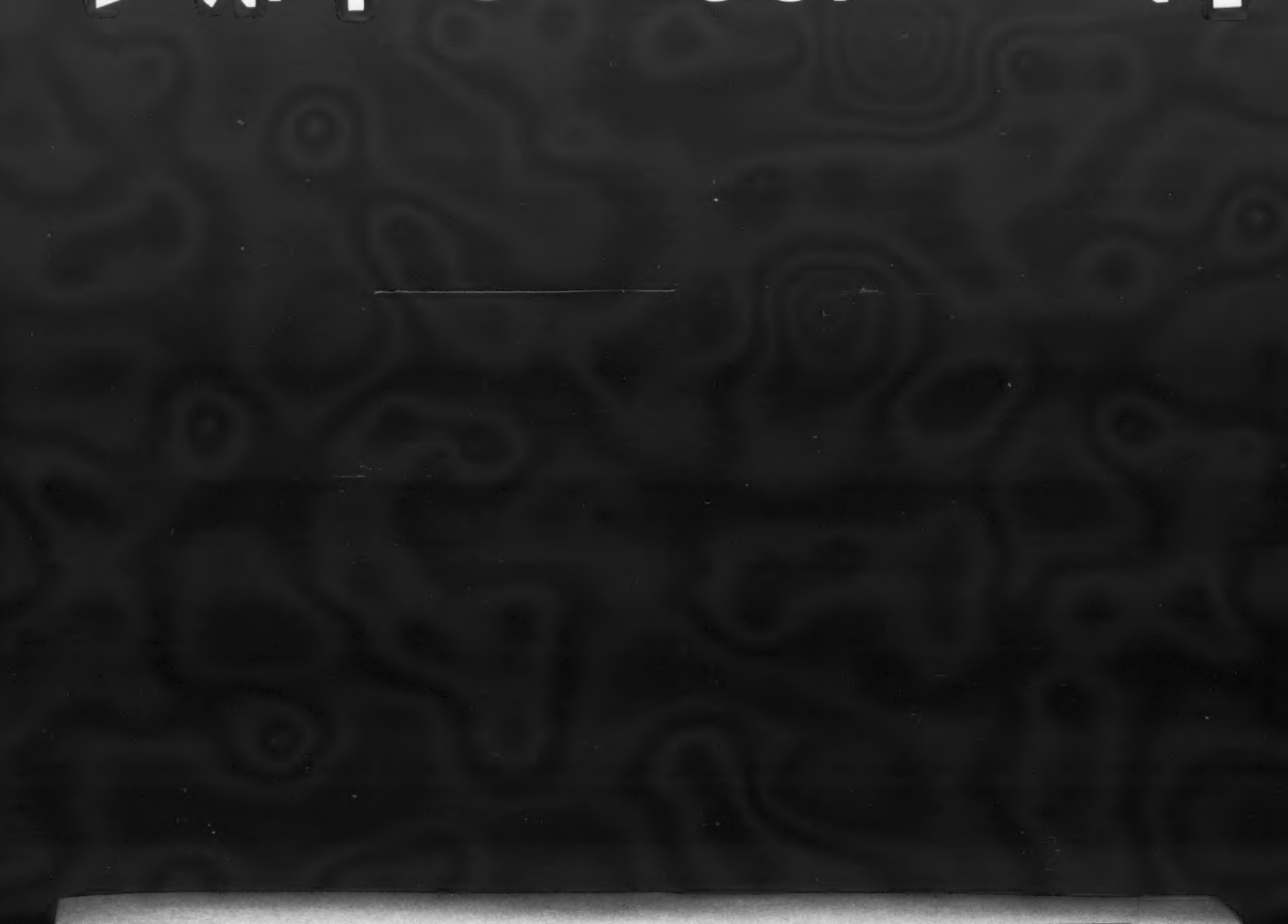

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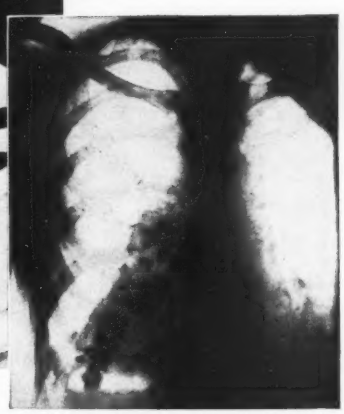

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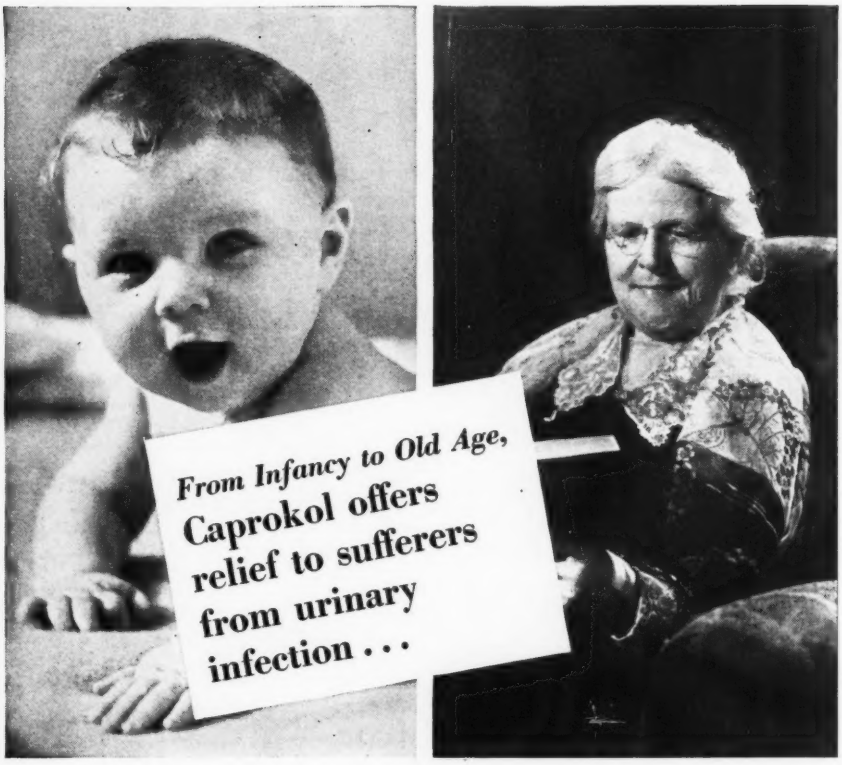

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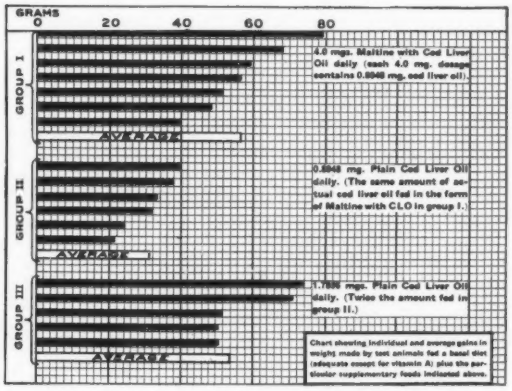
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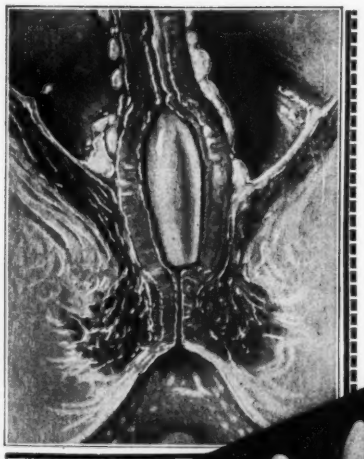

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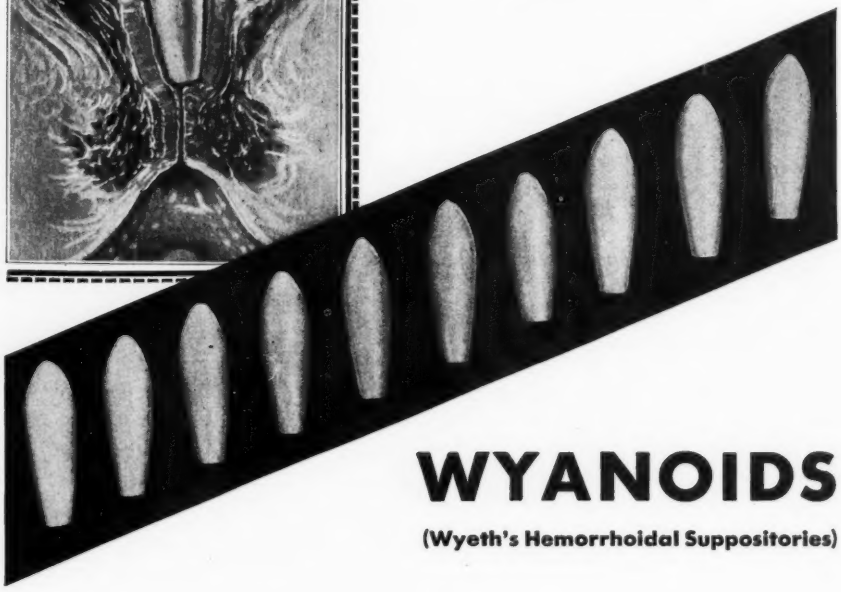

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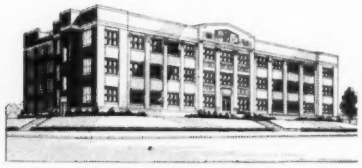

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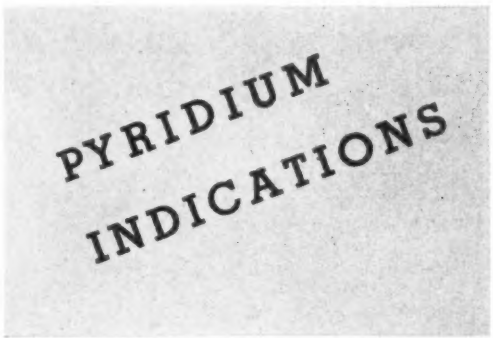

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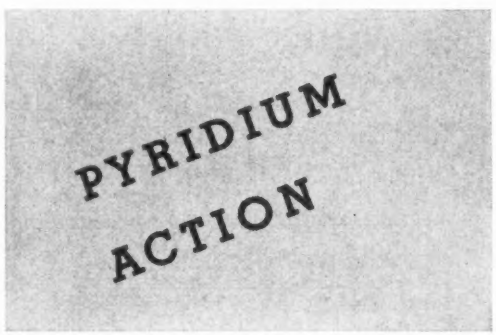

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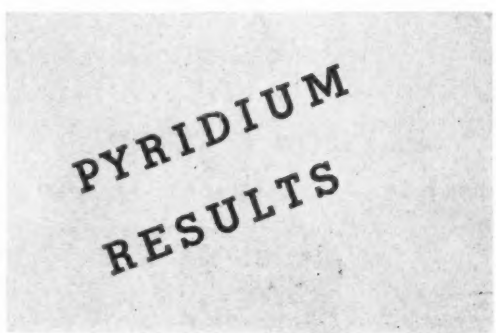

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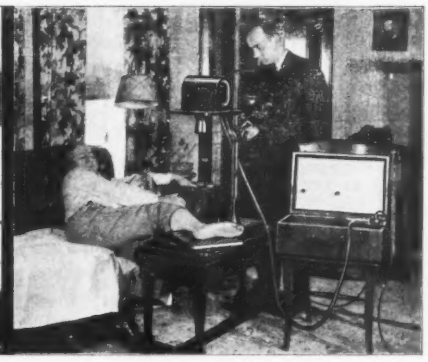

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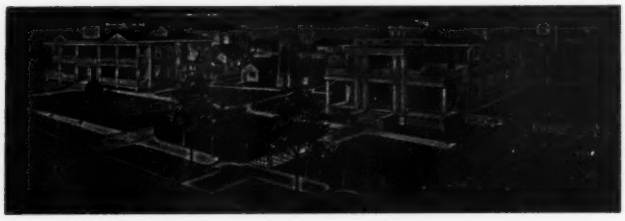

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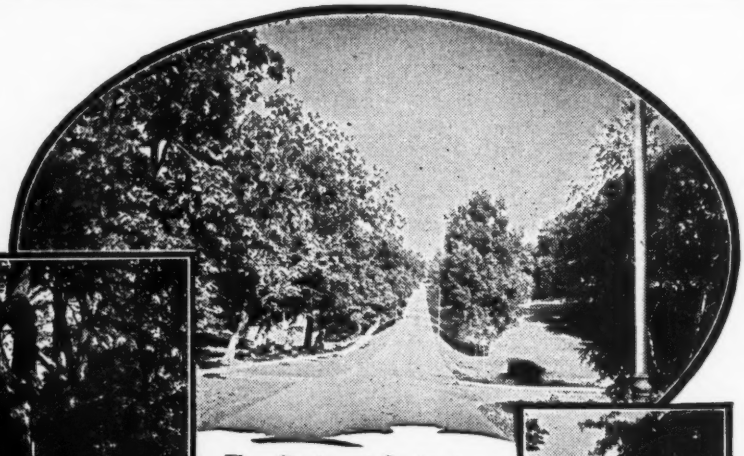

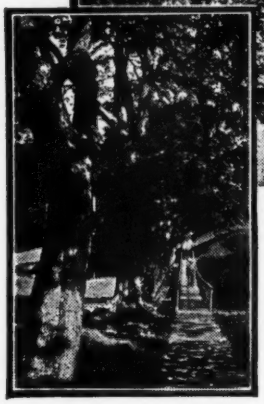

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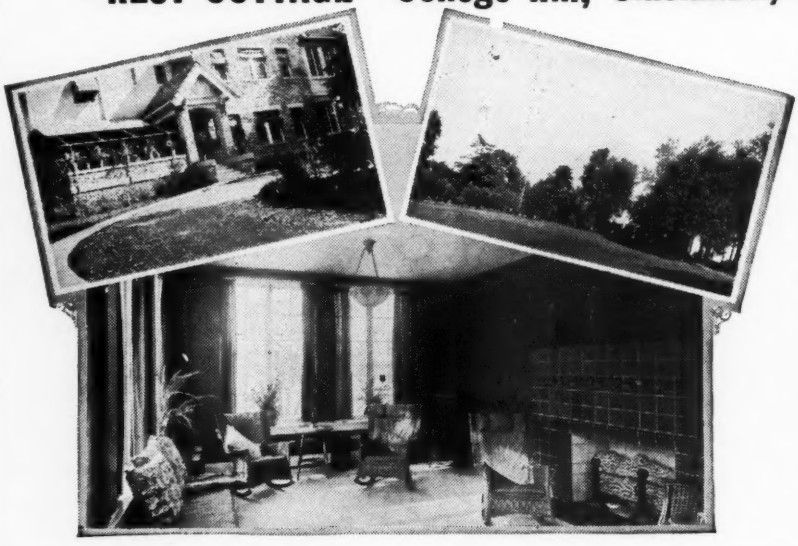

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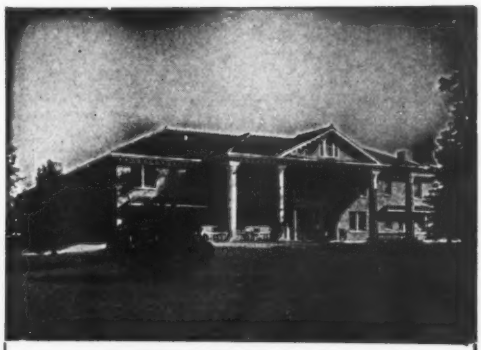

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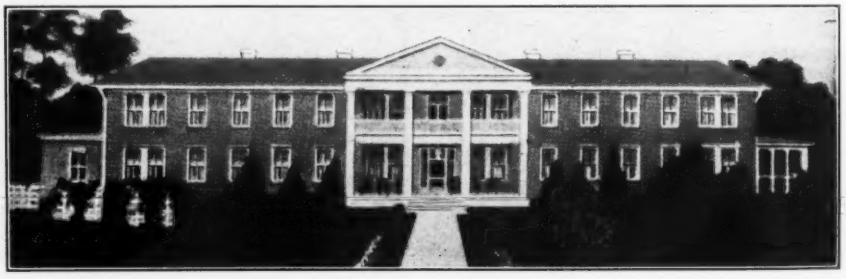

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Volume 27 OCTOBER 1934 Number 10

A CONSIDERATION OF THE URETER IN SERIAL PYELOGRAMS*

By THOMAS D. MOORE, M.D.,
Memphis, Tennessee

In the practice of urology, pyelography occupies a place of primary importance as an aid in diagnosis. In making retrograde pyelograms a ureteral catheter is essentially a foreign body, which becomes a distorting factor in the physiological motility of the urinary tract. Pyelograms made after the catheter is withdrawn are much more dependable, but because of the rapid emptying of the renal pelvis and ureter it has been impractical to obtain more than one good film by the methods usually employed; the time lost in changing cassettes allows most of the radiopaque fluid to be expelled into the bladder and the second pyelogram results in failure. In the roentgen examination of any structure subject to peristalsis it has been recognized for many years that a series of films is much more dependable for diagnostic purposes than a single exposure. This principle was recognized and generally adopted long ago in the roentgen examination of the gastro-intestinal tract. Excretory urography would be ideal for serial pyelograms could one be sure of the optimum time for the exposures and that the ureters were well filled. These factors are so variable that this method seldom has proved satisfactory. The technical difficulties of obtaining multiple rapid exposures were largely overcome by the ingenious apparatus developed by Jarre and Cumming,[1] which they called the cinex-camera. It embodied the principle of the motion picture camera and made possible series of ten to fifteen pyelograms in rapid succession with one injection of radiopaque fluid. It was hardly possible for the cinex-camera to be adopted generally as a part of urological armamentarium, because of the large initial cost and the disadvantage that it required special film in rolls and special accessories for processing.

In 1931, the writer devised a simple modification of the Bucky diaphragm tray, which made possible the taking of three pyelograms in rapid sequence. The exposures are made after one injection; the catheter is withdrawn from the ureter; a standard 14 by 17-inch film is employed. A detailed description of this device has been published.[2] Later a report was made of its advantages in urologic diagnosis.[3] Since then its continued use has amply confirmed the early favorable impression of its value. It is believed that a brief review of this experience, with special reference to its use in investigation of the ureter, will be of interest. So far it has been employed in the urological investigation of 234 patients, 177 (75.6 per cent) were females and 57 (24.4 per cent) were males. Three hundred nineteen series of pyelograms have been obtained, of which 131 were of the right side, 78 of the left, and 55 bilateral. In making a series of pyelograms a standard interval between exposures was not observed; the only time lost being that required for springing the Bucky and shifting the cassette to a new position between exposures. Usually not more than thirty or forty seconds elapsed in making three exposures when the patient was of average weight. The first and third of the series have been made when the diaphragm was at its highest position at the end of exhalation; the second exposure has been made after a full inspiration, when the diaphragm was at its lowest position in the respiratory excursion. In those instances in which it was desirable to determine the emptying time of the kidney, the value of which has been pointed out by Goldstein,[4] exposures for the second series were made five, ten, and fifteen minutes, respectively, after the original injection.

In the study and interpretation of single pyelograms it seems there has been a tendency to overlook the fact that the ureter normally is

*Read in Section on Urology, Southern Medical Association, Twenty-Seventh Annual Meeting, Richmond, Virginia, November 14-17, 1933.

Fig. 1

Normal ureteral peristalsis. Note variation in points of narrowing and relaxation of the ureter. (From The Journal of Urology.)

subject to peristalsis. Evidently it has sometimes been regarded as a tube of more or less fixed caliber which serves as a channel for the passage of urine from the kidney into the bladder. Certain physiological narrowings and spindles have been recognized, but even these apparently have been interpreted by some as evidence of a pathologic condition. In serial pyelograms it has been a revelation to observe the marked variations in caliber of the ureter from one moment to another when multiple exposures are made in rapid succession. This has been the experience of those employing pyeloscopy (Manges,[5] Legueu,[6] and Herbst[7]). Marked points of narrowing may be noted in one film, and in the next these may have relaxed, while yet other constricted areas may have appeared (*Fig. 1*). Such wide variations in caliber of the ureter, indicating motility, have repeatedly demonstrated that the single pyelogram may lead to erroneous conclusions. Especially is this true in the diagnosis of stricture of the ureter and moderate degrees of atony. In the series of 319 pyelograms there was definite evidence of peristalsis in 300 (94 per cent). On a basis of 4, this was graded 1 or 2 in 159 (49.8 per cent), and graded 3 or 4 in 140 (43.9 per cent); in 20 (6.3 per cent) no signs of peritalsis were apparent.

A determination of the emptying time of the ureter is of value in the identification of shadowless obstructions. In four instances of ureteral lithiasis, in which the stones were permeable to the x-ray, the ureterograms after fifteen minutes disclosed retention of the media (*Fig. 2*). In conjunction with wax bulb evidence the nature of the obstruction was determined.

Ureteral Kinks.—The importance of kinks of the ureter has been a subject of controversy. A review of the literature reveals that the finding of a distinct kink is considered by some urologists a definite indication for a nephropexy. Others have taken a more conservative attitude and have regarded kinks as of little clinical importance, unless accompanied by evidence of obstruction, such as dilatation of the ureter above the point of kinking. Smith and Ockerblad,[8] after a clinical and experimental study, concluded that kinks have very little if any part in the production of ureteral colic; that they are a by-product of obstruction of the lower ureter which is the real factor responsible for the colic. Thompson and Bumpus[9] demonstrated that the majority of kinks are transient and occur in pyelograms at the order, "take a deep breath and hold it." In this series of 234

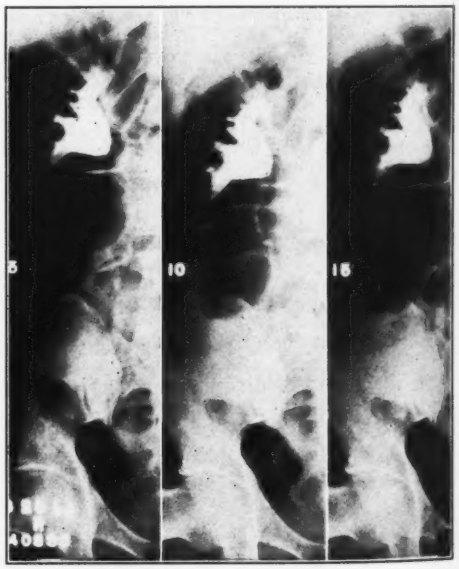

Fig. 2

Films made five, ten, and fifteen minutes after injection of radiopaque fluid. Delayed emptying due to obstruction in terminal ureter which proved to be a small stone permeable to the x-ray.

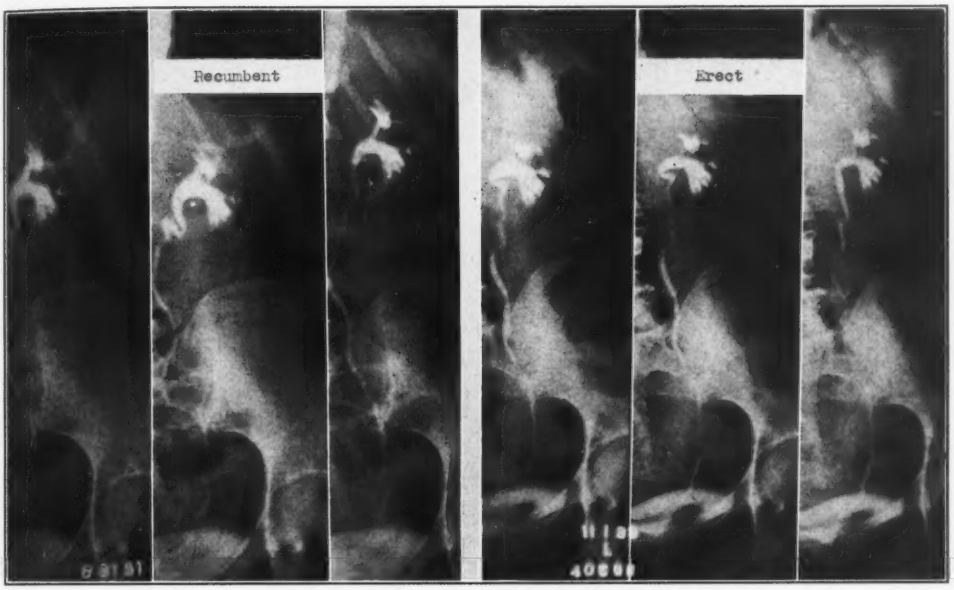

Fig. 3
Marked kinking of the upper ureter which was transient in the erect as well as recumbent posture. Note absence of evidence of obstruction.

patients, kinking of the ureter was noted in 83 (35.5 per cent); in 69 (29.5 per cent) the kinking was transient; in 14 (6 per cent) the kinks were constant, but in only 1 of these was the ureter dilated above the kink. The transient nature of kinks was noted both in the recumbent and erect postures (*Fig. 3*). Recently, in a group of 19 patients in whom transient kinking in the upper ureter was observed, there was an associated renal infection in 10; in 7 there was partial or complete obstruction of the ureter, due to stone in 3, stricture in 2, and localized spasm in 2. In instances of marked ureterectasis the ureter evidently becomes elongated, as well as dilated in circumference, accompanied by extreme degrees of kinking or folding on itself in the redundant state. Correction of the obstruction or the clearing up of an infection in such cases, with restoration of the normal ureteral tone, as a rule is followed by the disappearance of the kink (*Fig. 4*). It seems reasonable to conclude in view of these observations that the great majority of ureteral kinks are transient and do not require correction by surgical means. In many cases they may be regarded as evidence of some type of obstruction or associated infection to which treatment should be directed.

The Ureter in Hydronephrosis.—In any case of hydronephrosis it is highly desirable to determine the nature and site of an etiologic obstruction. When the hydronephrotic sac has been well filled with radiopaque fluid the constant absence of the media, or lack of filling of the upper ureter, in the serial pyelograms is indicative of a high obstruction. In four cases this interpretation proved to be correct on exploration of the kidney, and the obstruction was found to be due to an aberrant vessel crossing the ureter and entering the lower pole of the kidney (*Fig. 5*). In unilateral hydronephrosis, with the point of obstruction lower down along the course of the ureter, diffuse dilatation was usually noted accompanied by the absence of evidences of motility.

Strictures.—Stricture of the ureter is another entity concerning which much controversy has existed. With no intention to re-kindle this controversial flame, the subject is approached with due consideration of the views of those who are firmly convinced that it is a very common lesion, as well as those who have taken a more conservative attitude and are as firmly convinced that it is of unusual occurrence. If one accepts the criteria recently given by Crabtree and Kontoff,[10] its incidence will be rela-

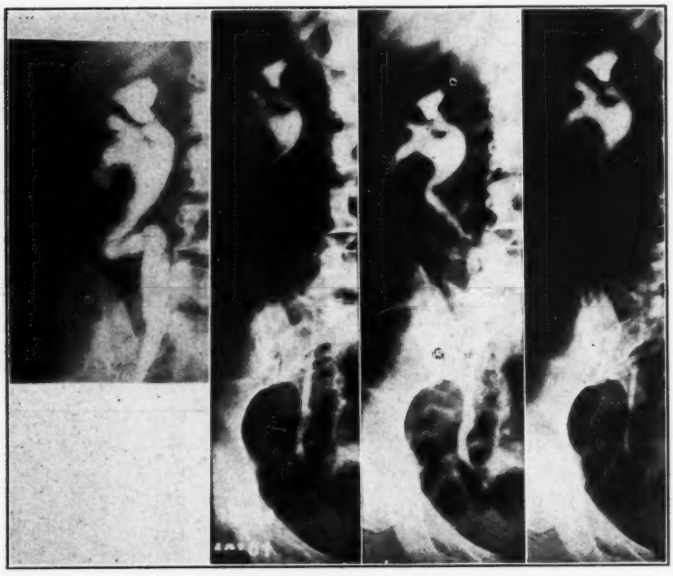

Fig. 4

Stricture of lower ureter with marked ureterectasis, pyelectasis, and kinking of upper ureter. Serial pyelograms made three months after institution of ureteral dilatations and pelvic lavage disclose disappearance of kink and the outline of the pelvis and ureter approaching normal.

tively infrequent. In a report of the end-results in the treatment of 40 cases these authors included "only those in which some degree of ureteral obstruction to catheters has been accompanied by persistent ureterogram deformity situated in a constant area with dilated tract above." These features are essentially those upon which Braasch[11] has insisted and clearly exclude ureteral spasm, edema, and other conditions unaccompanied by permanent back pressure changes in the ureter above the lesion. In searching for stricture, if one is governed by the chief diagnostic sign described by Hunner,[12] the "hang" of a bulb on its withdrawal from the ureter, stricture so diagnosed will be found very frequently. Serial pyelograms, however,

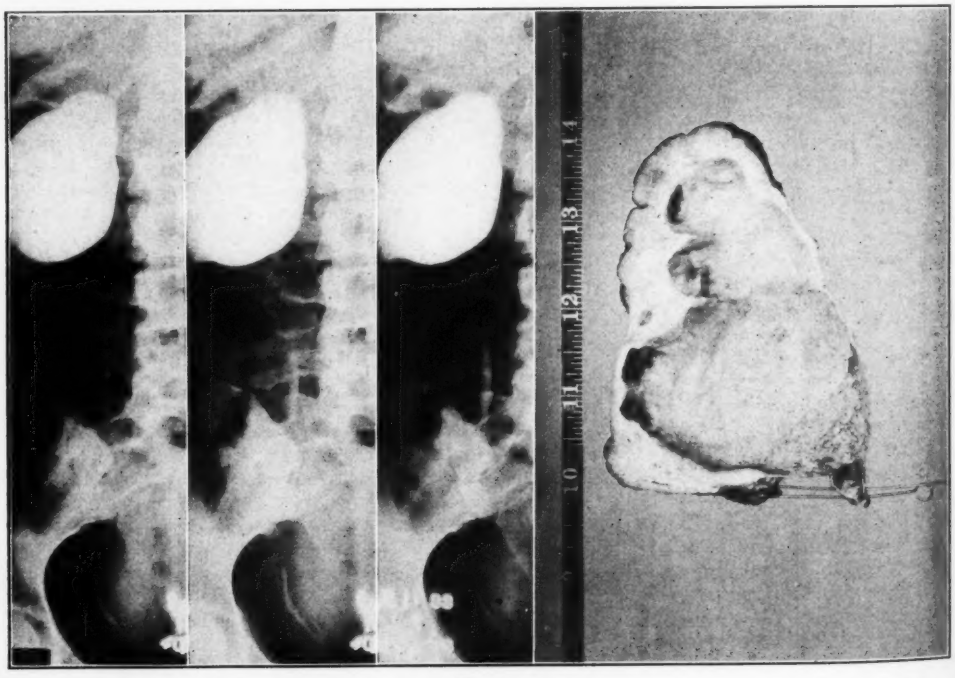

Fig. 5

Although the hydronephrotic sac is well filled, note the constant absence of media in the upper ureter indicating a high obstruction. At operation aberrant vessels at the lower pole proved to be the etiologic factor in the obstruction.

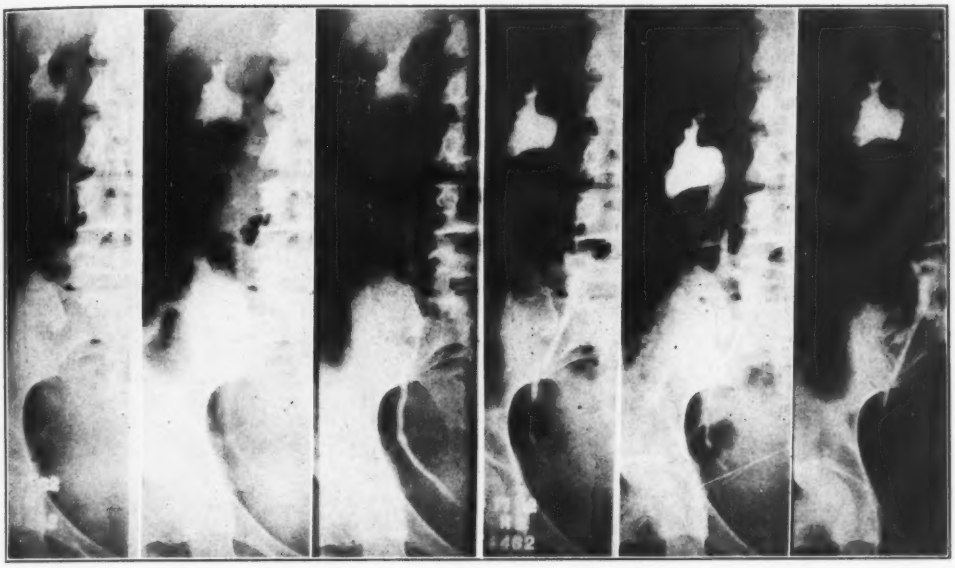

Fig. 6

Note the normal ureter in the first series and the constant points of marked narrowing of the lower ureter in the second series, which was made immediately after the passage of a 12F. bulb; although a definite "hang" was felt at this point, the obvious diagnosis is ureteral spasm. (From The Journal of Urology.)

made immediately before and immediately after the passage of a bulb have repeatedly disclosed normal ureters in the first series and constant points of narrowing in the second series, corresponding to the site or sites where the hang of the bulb was felt (*Fig. 6*). Spasm of the ureter, precipitated by the passage of the bulb, is the only logical conclusion to be drawn from these findings. The first series is made with the least possible irritation of the ureter by using a well lubricated, small, olive tipped catheter; in a few instances excretory urography with compression employed, except during the actual time of the exposures, has been used satisfactorily. For the second series a No. 10 or 12 F. bulb has been used, or a smaller one is selected if these cannot be passed with ease. It has been noted, on the repetition of this procedure, that the same points in the ureter become spastic and that in those individuals, in which marked spasm occurs, there seems to be a definite degree of hypersensitiveness along the course of the ureter. Why the same sites should react in this way is not clear. A possible explanation is offered in the light of the findings of Frater and Braasch,[13] who made a critical study of the ureters in 93 unselected cases at necropsy. In none was there a definite stricture of the ureter found, but small collections of lymphocytes or leukocytes, scattered in the wall of the ureter, unaccompanied by fibrous or degenerative changes, were not uncommon. Such lesions histologically bear some resemblance to that of submucous or panmural cystitis, a well-known feature of which is an extreme degree of local sensitiveness. It is possible that these areas, which must be regarded as inflammatory in origin, give rise to local tenderness, pain, and spasm, which are temporarily ameliorated by dilatation of the ureter, in much the same way that hydraulic distention of the bladder affords temporary relief in cases of panmural cystitis.

The evidence of normal ureteral peristalsis, noted in serial ureterograms, may closely simulate stricture in single exposures. In one of the series the ureter may end abruptly near the brim of the bony pelvis (*Fig. 7*). A recent perusal of the literature pertaining to stricture of the ureter disclosed many illustrative single pyelograms with such a picture interpreted as evidence of ureteral stricture. Serial films, however, in my experience have proved that such a filling defect must be noted constantly in the series before it can be properly evaluated (*Fig. 8*). By conforming to the strict criteria of stricture mentioned herein, in a recent group

Fig. 7

In the third film the abrupt termination of the ureter in the region of the sacrum, with slight dilatation above, is suggestive of ureteral stricture. The other films of the series, however, exclude such a diagnosis.

of 80 patients, the lesion was found only six times. In the same group ureteral spasm was noted in 16, in 9 of which the upper ureter was involved, in 6 the lower ureter, and in 1 there were two areas of spasm, one in the upper and one in the lower.

Dilatation of the Ureter.—The common causes of dilatation of the ureter are mechanical obstruction, infection, and disturbances of innervation. In instances of obstruction, the dilatation is greatest immediately above the obstructed point and occurs more frequently in the lower ureter. Renal infection, chronic in type, is commonly associated with dilatation of the ureter, which is not due to mechanical obstruction, but rather to tissue changes in the wall of the ureter. Braasch[14] refers to this as inflammatory dilatation and states that it may be the only evidence of a previously existing inflammatory process. It is more apt to involve the upper portion of the ureter, which may be irregular in outline and tortuous in its course. Serial ureterograms in such cases indicate that peristalsis is often absent or sluggish, a feature which was listed by Cumming and Jarre[15] in the roentgen symptomatology of infected urinary passages. In a recent review of 108 serial pyelograms, variable degrees of ureterectasis were noted in 20, in 15 of which infection was present. In one instance of chronic pyelonephritis an advanced degree of dilatation, involving the upper three-fourths of the ureter and renal pelvis, was followed by a normal outline of the calices and pelvis, with a return of normal ureteral peristalsis when the infection disappeared (*Fig. 9*).

When dilatation of the ureter is of neurogenic origin, especially in cases of spinal cord disease, an advanced degree of atony of the ureter may occur. This is presumably due to a disturbance of the nerve supply of the ureter, in much the same way that the bladder may be involved in paralysis. In children with congenital defects of the spine the ureter may be large and tortuous.

In the study of serial pyelograms it has been noted that the ureter may appear markedly dilated or atonic in one film and the others of the series will reveal a state of contraction in the same area (*Fig. 10*). This observation would indicate that the single retrograde pyelogram cannot always be relied upon for the diagnosis of atony or ureterectasis. It is evident that such instances of temporary relaxation are confusing and unless the dilatation is constant

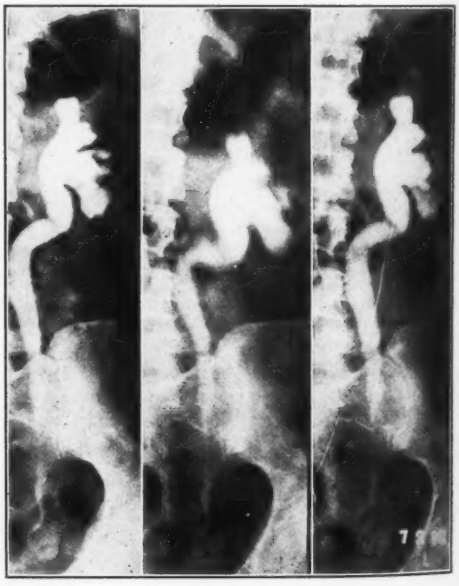

Fig. 8

Stricture of lower ureter. Note the point of constant narrowing with constant dilatation above the obstruction.

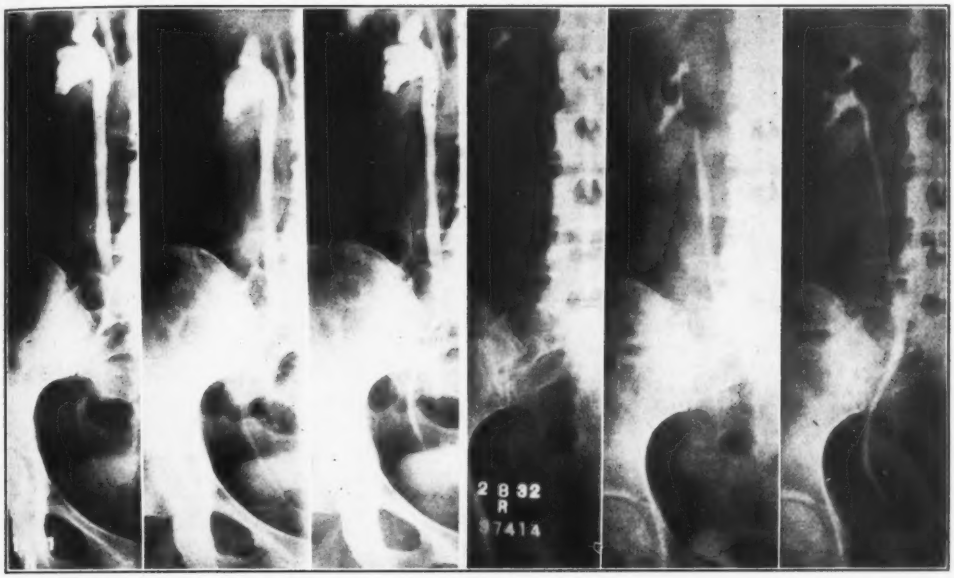

Fig. 9

Moderate ureterectasis and pyelectasis associated with chronic pyelonephritis. The second series made five months after the institution of treatment discloses a return of normal peristalsis. (From The Journal of Urology.)

Fig. 10

In the first film the mid-ureter appears atonic. Its normal appearance in the others of the series excludes atony.

in the series of films it may be of little significance.

In the presence of renal tuberculosis dilatation of the ureter also occurs and when the disease is advanced the outline is somewhat irregular, the dilatation is diffuse, and such changes are constant in the series of films with little if any evidence of peristalsis. With moderate or early involvement of the ureter, a constant narrowing, with dilatation immediately above, may mark the beginning of a tuberculous stricture.

SUMMARY

In the urologic investigation of 234 patients, 319 series of pyelograms were made, 94 per cent of which disclosed definite evidences of ureteral peristalsis.

Serial ureterograms, as obtained with the serial pyelograph, are far more informative than the single retrograde pyelogram, as usually made. Filling defects, kinks, constrictions, and deformities are frequently transient and when observed in the single pyelogram are difficult to evaluate; when constantly present in a series of films they may be regarded as of definite significance.

Serial ureterograms are of value in identifying

shadowless obstructions of the ureter, with special reference to calculi permeable to the x-ray.

Kinking of the ureter was found in 83 of 234 patients; in 69 (83.1 per cent) the kinking was transient. The majority of kinks may be regarded as evidence of some type of ureteral obstruction or associated infection.

In unilateral hydronephrosis the urographic evidence of a constant lack of filling of the upper ureter is indicative of a high obstruction; constant dilatation above the obstructed point characterizes those found along the course of the ureter.

Points of narrowing in a single ureterogram can rarely be interpreted as evidence of stricture, because normal ureteral peristalsis is a cause of such constrictions in more than 90 per cent of pyelograms. Urographic evidence of ureteral stricture is characterized by a point of constant narrowing in serial ureterograms with constant dilatation above the site of the lesion.

Series of pyelograms made immediately before and immediately after the passage of a bulb through the ureter reveal that the "hang" noted on withdrawal of the bulb is more often due to spasm than stricture.

Temporary relaxation of the ureter resembling atony or ureterectasis may occur. Its inconstancy in a series of pyelograms serves to differentiate it from dilatation due to mechanical obstruction, infection, or disturbances of innervation. In the latter conditions the dilatation is constant in the series of films.

In renal tuberculosis serial ureterograms are characterized by a constant irregularity of outline, with moderate dilatation and evidence of sluggish or absent peristalsis.

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DISCUSSION (*Abstract*)

Dr. Guy L. Hunner, Baltimore, Md.—Dr. Moore and I differ radically on many of the conclusions he has presented; yet that is what such meetings as this are for: honestly to present such conclusions as our methods of work seem to warrant. By getting the viewpoints of others working along similar lines we are stimulated to criticise our own work rigidly; and if our particular methods of work and interpretation have led to results we have not been able to obtain by other methods, we more patiently await the verdict of time in its function of sifting out the truth.

Dr. Linwood D. Keyser, Roanoke, Va.—My interest in ureteral pain, stricture and spasm was stimulated many years ago while I was a student of Dr. Hunner, who first called our attention to this important phase of urology.

Recently I have begun to use serial pyelography somewhat modified from Dr. Moore's technic which I had the opportunity of seeing in Memphis about two years ago. I think much of value is to be learned in such a study of the patient. Dr. Moore's simplification of the work of Jarre with the cinex-camera makes much of the information obtained from the latter elaborate apparatus available to us with little expense.

I am at present reviewing the records and end-results of something over 300 patients who have been treated by ureteral dilatation with bulb bearing catheters over a period of ten years. This study is as yet incomplete, but when pain or persistent infection have been noted as chief features of the case, pyelographic evidence of definite ureteral obstruction has been present in only 40 to 50 per cent.

I do not think that nervous influences causing ureteral hyperperistalsis and spasm; or urostasis due to atony or spasm; or poor drainage due to neurogenic block are properly appreciated. The work of Trattner with uretero-kymographic records is of interest here. The pyelogram may give very little evidence of urostasis, of stricture, or of pelvic ectasia in these types of painful kidney. The small painful hydronephrosis which is really not a hydronephrosis, but a pelvis actively contracting to small capacity, is certainly a clinical entity. Dr. Hunner dilates these ureters and especially is his insistence upon dilating as high as the ureteropelvic juncture to be heeded.

The painful nephralgias and nephritis dolorosa syndrome of the French school belong to this category. Papin, Legueu and others practice renal decapsulation and denervation with good results. Wharton, of Baltimore, reports excellent results from denervation of the ureter by a technic which involves stripping the ureter from its bed. Paravertebral injection of the sympathetic ganglia with 95 per cent alcohol after the technic

of Flothow is reported to be of value in giving relief to certain of these patients.

In my series of cases with pain as the chief symptom, fully 50 per cent require no more than thorough dilatation of the ureter for relief of pain over considerable periods of time. Unfortunately from dilatation alone almost 50 per cent sooner or later require further treatment. I think this is still the most conservative measure and the first to be applied. Renal and ureteral denervation seem radical procedures, but the use of alcohol injections of the sympathetic nerves in the future may prove to be of help in the more resistant cases.

I wish particularly to emphasize that the kidney pelvis and ureter may be the seat of painful stimuli even in the absence of pyelographic changes in contour and perhaps at times even without the hang of a bulb. Certainly persistent infection and even certain tumors and stones elude us at times if we place too much reliance on radiographic findings alone. Nevertheless, the serial pyelograph is a valuable contribution and its routine employment in the study of such cases should be encouraged.

Dr. Albert E. Goldstein, Baltimore, Md.—This is an intensely important piece of work. On account of the lack of time Dr. Moore has been unable to explain his slides in detail. The method is a rapid fire way of taking ureteropyelograms, that is, a plate with the catheter in, the catheter low down, the catheter out, and then a retention plate.

As far as I know, it was in the year 1921 that we first learned of serial ureteropyelography. In that year I introduced the work that Dr. Moore today has elaborated upon.

In 1921, I was stimulated by Dr. Hunner's work on the ureter and was anxious to learn more about the ureter and renal pelvis. Most people were under the impression that the ureter was just a straight tube. In this work I learned that the ureter was not a straight tube. I demonstrated, as Dr. Moore did today, that it had power of contraction and expansion, that it was narrow at certain points and dilated at others and that it had peristaltic action. I also demonstrated that it took from four to seven minutes to empty the contents of the pelvis and ureter when they were normal.

Since 1921, we have carried out the procedure of serial ureteropyelography in over one thousand cases.

It should be quite evident that a single ureteropyelogram with a catheter high up in the pelvis is of limited value.

It is more important to take them in a series as Dr. Moore does, in a series of three or six. Real interpretations of the existing conditions can best be obtained when this is done.

Unless serial ureteropyelograms are made many conditions will be missed such as strictures, shadowless obstructions, kinks, obstructions at ureterovesical and uretero-pelvic junctures, urinary stasis, and so on.

One does not necessarily have to be the possessor of such an elaborate set up as Dr. Moore has. Plates can be taken in sequence, but not necessarily so rapidly as he takes them. As a matter of fact, if they are taken too close together one may miss the real interpretation.

Our method is to take our plain plate first, then a plate with the pelvis injected and the catheter high up, the third with the patient in the erect posture with the catheter low down or out, and the fourth with the patient in the erect posture, the catheter out and ten minutes after the third plate was taken.

The last one is very important. If more of this work is done, better interpretations will be made as was brought out by Dr. Moore.

Dr. Moore (closing).—There is undoubtedly a difference of opinion as to the incidence of stricture of the ureter and the value of methods employed in its detection. On the other hand, in scientific matters the search for and arrival at the truth is chiefly of interest. I have laid before you the evidence gathered in a review of a number of serial pyelograms and have stated the conclusions which, it seems to me, can be reasonably drawn from this study.

Dr. Hunner has had a large experience in investigation of the ureter and ureteral stricture; his writings are followed closely and his ideas and opinions are due the most careful consideration and respect. There is no doubt that ureteral strictures are more common than was once believed. In a given case it may be a question of more or less academic interest as to whether a spasm or stricture is the cause of pain. Dilatation of the ureter will give temporary relief in either condition. When honest differences of opinion exist points may be argued indefinitely; too often, however, it may be compared to a Methodist trying to convert a Campbellite or a Campbellite trying to convert a Methodist; very little may be gained.

A NEW METHOD FOR THE LOCALIZATION OF INTRA-OCULAR FOREIGN BODIES WITH AN OUTLINE OF THEIR MANAGEMENT*

By M. Earle Brown, M.D.,
New Orleans, Louisiana

This subject is surveyed, not with the purpose of discrediting the well established methods of the present, but to report the inaccuracies (*Fig. 1, Case 1*), which have occurred during the past five years and the author's method of combating them (*Figs. 2* and *3, Case 2*).

In large industrial centers where radiologists are frequently called upon to make a localization by the Sweet method, I am sure ophthalmologists have no complaint about its accuracy, but in smaller industrial centers, not necessarily smaller communities, the results are not so good (*Fig. 1, Case 1*).

The statistics of the New Orleans Eye, Ear, Nose and Throat Hospital are quoted because

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it is the only hospital equipped with a giant magnet in a city of half a million population which is not an industrial center. From 1928 to 1933, inclusive, 45 intra-ocular foreign body cases were treated, 26 of which were private cases and 18 were clinic cases.

The technic of localization by Dr. Sweet's method is too well known to bear repetition here. However, one must concede that the inaccuracies (*Fig. 1, Case 1*) reported in this manuscript can only be from misinterpretation or faulty technic.

The subject is of great importance, as many intra-ocular foreign bodies opaque to the x-ray are non-magnetic (*Figs. 4* and *5, Case 3*) so that we lose the diagnostic and localizing value of the ocular response to the magnetic impulse, so important to the eye surgeon.

When the tip of the giant magnet is placed in contact with and in the center of the cornea of an eye containing an intra-ocular magnetic foreign body and the electric current is closed one or two notches, the eyeball accommodates itself to parallelism. Where the foreign body is non-magnetic no such ocular movement is observed. It is, therefore, apparent that the ocular response to the magnetic impulse demonstrates the presence of a magnetic foreign body within the eyeball (*Case 1*). When there is no response the foreign body may be within the eyeball but of non-magnetic elements, or may have passed through the eyeball into the orbital cavity.

Where the ocular response to the magnetic impulse is absent a lateral radiological study is made to determine the presence or absence of a foreign body within the orbit (*Fig. 2, Case 2*). Should one be found a double exposure picture is made in the posterior-anterior position (*Fig. 3, Case 2*). The patient's face is placed upon the film while the eyes are directed downward, the current is closed for the exposure, the eyes are then directed upward and the second exposure is made. Should two objects be observed upon the film, the foreign body is positively within the eyeball; should only one object be seen, the foreign body is extra-ocular or intra-ocular at the center of rotation. In such a case the eyes are moved from right to left.

The posterior-anterior view is used instead of the usual anterior-posterior in order to get the maximum sharpness of the foreign body with the least distortion and magnification. The usual anterior-posterior view offers more magnification and distortion with less sharpness of the foreign body.

The patient is placed upon the operating table in the recumbent position near the magnet instead of standing before it. The magnet is manipulated to a point directly over the center of the cornea, with its tip in contact with that membrane.

As the current is slowly closed, a sensation of pain is experienced when the foreign body begins to move upward. The current is reduced in order to permit the foreign body to be drawn slowly around the lens through the zonula of Zinn until it appears behind the iris, which it causes to bulge. The current is opened as quickly as possible or the magnet is raised to prevent injury to the iris. The current is again slowly closed while the magnet is gently manipulated to draw the foreign body into the anterior chamber through the pupil. The anterior chamber is then opened at axis 90° with a keratome, the tip of the giant magnet is removed and the Victor flexible extension is attached, which reduces the magnetic force from the giant type to a small one. The flexible tip is introduced into the anterior chamber, the current is closed slowly and the foreign body is gently withdrawn.

It often occurs that the foreign body cannot be drawn into the anterior chamber because the pupil cannot be dilated or the piece of metal is jagged and becomes entangled in the folds of the iris. In such a case an iridectomy is performed and the piece of metal is delivered through the coloboma.

It is an erroneous idea to suppose that removal of intra-ocular foreign bodies by the method just described produces injury to the lens or capsule. Of course, the lines of magnetic force pulling from one end of the giant magnet to the other under ordinary conditions must necessarily pull in parallel lines when the tip of the magnet is placed in contact with and in the center of the cornea. The course of the foreign body is parallel as it passes through the vitreous, but becomes deflected when it reaches the lens because it passes from a medium of lesser resistance (vitreous) to a greater one (lens), the surface of which is biconvex and elastic.

In cases where the wound of entrance is in the cornea and the piece of steel has passed through the capsule and lens with the aqueous and vitreous in contact with the lens fibers, cloudy swelling and later disintegration with

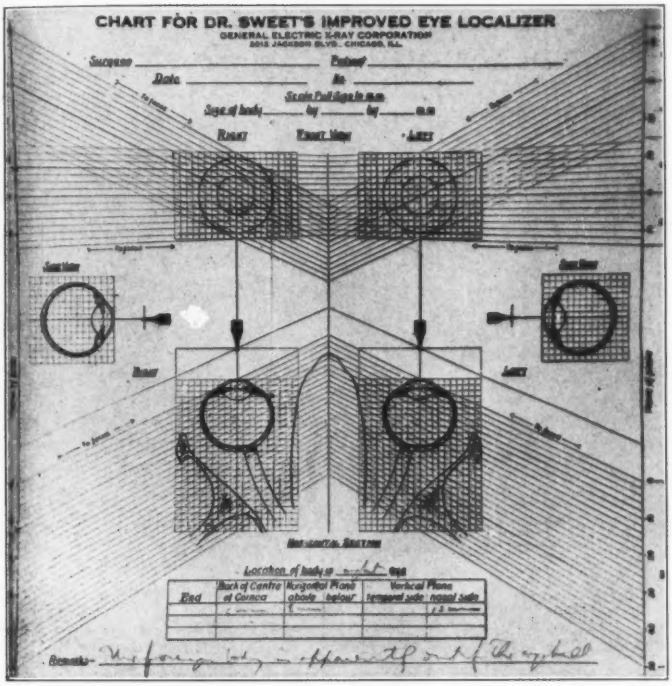

Fig. 1. Case 1

softening follows (traumatic cataract), thus reducing the resistance of the lens. The piece of metal following parallel lines enters the anterior chamber through the softened lens.

The advantage of the double exposure method of localizing intra-ocular foreign bodies lies in its extreme simplicity, since it requires no other apparatus than the ordinary x-ray machine.

Case 1.—P. H., a white man, married, aged 26, a truck driver, was injured while repairing an axle. A fragment of steel entered the right eye near the limbus on the nasal side July 15, 1932. He applied for treatment in the outdoor clinic of the Eye, Ear, Nose and Throat Hospital. The interne's clinical notes state that the patient came in as an emergency case, was admitted to the hospital and no foreign body could be seen with the ophthalmoscope because of blood in the anterior chamber. Sedatives were ordered and he was sent to the radiological laboratory for study July 16, 1932.

Fig. 1 shows the chart for Dr. Sweet's improved eye localizer as interpreted by the staff radiologist, showing "the foreign body apparently out of the eyeball." The patient was prepared and sent to the operating room, the eye was anesthetized and placed in position before the giant magnet. The ocular response to the magnetic impulse was present. The electric current was then closed and the piece of steel was drawn around the lens and under the iris, becoming entangled within its structure. An incision was made in the cornea at axis 90° with a keratome, the iris was withdrawn and excised, the Victor flexible extension was attached to the magnet and the small end was placed in the anterior chamber. The current was gently closed while the foreign body was removed. The iris pillars were replaced, atropine instilled, the eye bandaged, and the patient returned to the ward.

July 17, 1932, routine inspection was made. The pillars were in position. The usual reaction incident to these procedures was observed. One per cent atropine solution was instilled and the eye bandaged.

July 18, 1932, the reaction was subsiding, atropine was instilled and the eye bandaged.

July 19, 1932, to July 22, 1932, he improved.

July 23, 1932, there were no signs of a traumatic cataract.

July 25, 1932, he was permitted to go home, the bandage removed. The reaction was subsiding. He was to attend the outdoor clinic.

August 1, 1932, the eye was quiet. Vision was 20/60. He was to be refracted.

August 5, 1932, the patient discontinued treatment, unauthorized by the attending surgeon.

March 8, 1933, central vision in the right eye was 20/60: 6/18; 30.0 visual loss. In the left eye it was

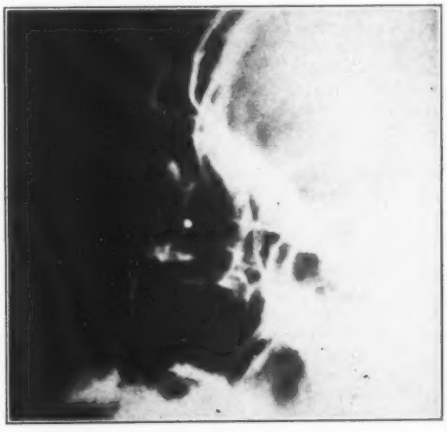

Fig. 2. Case 2
Lateral study showing metallic foreign body in the orbit.

Fig. 3, Case 2
Double exposure method in the posterior-anterior position showing non-magnetic foreign body within the eyeball.

20/30: 6/9; 8.6 visual loss. The eye was quiet. He complained of photophobia from glare. Cruxite shade B was prescribed with correcting lens, which brought central vision to 20/20: 6/6. He had 100 per cent efficiency in each eye.

Case 2 (*Figs. 2* and *3*).—E. R., an unmarried colored man from Laplace, Louisiana, a field laborer, four days previous to admission, while hunting birds, was struck by something in the left eye. He received first aid at the Eye, Ear, Nose and Throat Hospital September 29, 1932.

The left eye presented marked conjunctival irritation. The cornea was clear. There was a wound in the sclera 3 mm. to the left at 3 o'clock of the dial on the temporal side about 2 mm. in diameter. The anterior chamber was filled with blood. Intra-ocular tension was minus. There was no light perception or projection.

Posterior-anterior study with double exposure showed the presence of an intra-ocular foreign body.

September 30, 1932, the eye was enucleated.

On October 2, 1932, he was discharged.

Case 3 (*Figs 4* and *5*).—G. W., aged 23, single, colored, farm laborer, was struck in the right eye with birdshot while hunting, 72 hours before his admission.

The right eye presented a cloudy and perforated cornea with a collapsed anterior chamber. The wound of entrance was in the center of the cornea, the lens fibers were in the stage of disintegration. Intra-ocular tension was minus. There was no light perception or projection.

The eyeball was enucleated. Upon section the shot was found in the eyeball.

Case 4 (*Fig. 6*).—J. B., a white man, aged 28, married, while hunting with some friends, was struck in the right eye by a shot. The wound of entrance went through the cornea on the temporal side. Vitreous and

Fig. 4, Case 3
Lateral study showing the presence of a non-magnetic foreign body.

Fig. 5, Case 3
A double exposure posterior-anterior study showing the foreign body within the eyeball.

Fig. 6, Case 4
Double exposure method showing a bird shot within the eyeball near the central plane.

blood protruded from the wound. The eyeball was soft. There was no light perception or projection. Double exposure, posterior-anterior view, showed the shot within the eyeball. This was made to check Dr. Sweet's localizer, which placed the shot 12 mm. behind the center of the cornea.

The eye was enucleated. Upon section the shot was anterior to the central plane and below.

921 Canal Street

DISCUSSION (*Abstract*)

Dr. Emory Hill, Richmond, Va.—I regard the Sweet method of localization as a very accurate and satisfactory one. We have no difficulty in Richmond in having this localization made by the x-ray men. It has never failed me but once and then the mistake was of no serious consequence. I think the method of taking two pictures with the eye rotated in different directions may be of considerable value in a very limited number of cases. I may cite such a case in which the patient was seen two weeks after a perforating injury. A foreign body 6 x 2 x 2 mm. was located 24 mm. back of the center of the cornea, 3 mm. above the horizontal plane and precisely in the sagittal plane. This meant that the foreign body was either in the sclera or just behind it unless we were dealing with a very myopic eye. Pictures with the eye looking far up and far down showed that the foreign body had moved perceptibly. Therefore, it could not be completely behind the eye. Enucleation was done because the eye was hopelessly blind and soft. The steel was found partly within the sclera and partly protruding behind it.

In my opinion the giant magnet is absolutely contraindicated. I believe that any eye from which a foreign body has been removed by the giant magnet when the foreign body could not be removed by a small magnet is a doomed eye.

I am strongly in favor of the posterior route when a foreign body is in the vitreous chamber and has not already produced a cataract. The theoretical objection that the vitreous has a low resistance to infection, and that detachment of the retina is a possible mishap, is overbalanced by the probable calamity of destroying important tissues in the anterior segment of the globe by attempting extraction through the wound of entrance.

In any event, the outcome of magnet extractions is far from satisfactory and a minimum of trauma with a small magnet is the choice of evils.

Dr. Clifton M. Miller, Richmond, Va.—We should ceaselessly emphasize to employers and mechanics the importance of the prevention of such accidents by the wearing of goggles in all working places where flying particles are liable to reach the eye.

I differ entirely with Dr. Brown in his advocacy of the removal of these bodies through the wound of entrance and the anterior chamber. I am well aware of the fact that Haab in a paper which he read on the subject at the time of presenting his giant magnet advocated this method.

I prefer to make an incision as near as possible to the foreign body after it has been localized and remove it through the sclera. In my hands the Haab magnet with the flexible extension tip serves the purpose of both the giant magnet and the Sweet magnet, the flexible tip serving all the purposes of the Sweet magnet. I have no hesitation in very gently inserting a small tip into the vitreous when a body does not readily move by the use of the magnet on the exterior of the eye.

Dr. Wm. Thornwall Davis, Washington, D. C.—For many reasons an x-ray localization is not always to be depended upon. Every ophthalmologist should use other methods also. The foreign body may not be opaque to the x-ray.

I am much interested in "the ocular response to the magnetic impulse" spoken of by Dr. Brown. I have had no personal experience with it. The double exposure in the posterior-anterior position is of great practical value and should be most helpful. A small foreign body within the sclera or within the episcleral tissue immediately outside the globe would move when the eye moved and this might be deceptive. Small nonmagnetic foreign bodies within the globe may frequently be left alone. Rather than enter the vitreous chamber it might be better surgical judgment to allow such a body to remain, meanwhile watching the eye.

Disturbing the vitreous in removing foreign bodies may be productive of serious late results, and should not be done where it can be avoided.

The choice of the route for removal of the foreign body is a much mooted question. In general, one would advise the use of the route Dr. Brown has suggested, that is, the anterior route, unless there were distinct contraindications.

Dr. Brown states that in using the anterior route there is no danger to the structures of the globe as the foreign body passes around the lens and through the zonule and this, in my experience, is true. Even though there were danger, and I think there might be with large or jagged pieces of metal, this danger would be

less than excessive trauma in the vitreous chamber with resulting glaucoma, detached retina or vitreous hemorrhage, when the posterior route is used. The wound of entrance should be utilized whether it be posterior or anterior, when this is possible. The choice of these three routes must rest with the surgical judgment and experience of the surgeon. It is obviously more necessary to have an x-ray localization when the posterior route is used.

A wide dilatation of the pupil should be secured before any magnet operations via the anterior route, or the whole iris might be dragged out of the eye. In the B.E.F. during the war the anterior route was almost universally used. The British ophthalmologists stated that localization is by no means essential to successful treatment and if several hours' delay were involved, it should be omitted. The presence of pain, in particular localized pain, was considered by the English surgeons to be a most important indication of the presence or absence of a foreign body in the globe.

After the foreign body is drawn into the anterior chamber an incision is made above 3 mm. from the limbus. The foreign body is then drawn or coaxed along the posterior surface of the cornea by the magnet tip on the outside of the cornea. When the foreign body reaches the wound the posterior lip is depressed and the foreign body slips out.

Personally, I have always inserted the tip of the hand magnet through the wound and withdrawn the foreign body after it has been brought into the anterior chamber.

The surgeon should remember this: when he removes a foreign body from an eye his work has just begun. Hence the importance of traumatizing as little as possible. Better leave a small non-magnetic foreign body in the vitreous chamber and see whether it will be quiet than lose the eye some weeks or months later from meddlesome interference, with resulting uveitis, glaucoma and the possibilities always in such eyes of sympathetic ophthalmia. Illy advised surgery, or surgery in the hands of a person lacking experience or conscience, may be much more dangerous than the foreign body in the vitreous. When uveitis does occur following foreign body extractions it should be actively combated from its inception. The fellow eye should be closely watched for evidence of sympathetic inflammation. When vitreous disturbances and retinal detachment occur, which is not infrequent when the foreign body has been removed by the posterior route, little can be done.

Dr. W. Wallace Gill, Richmond, Va.—In the localization of foreign bodies the Sweet method, used by Richmond roentgenologists, has been eminently satisfactory. My first experience in the removal of magnetic foreign bodies was with the giant Haab magnet at the old New York Ophthalmic and Aural Institute (Dr. Herman Knapp's). That was in 1907 and 1908. In my early practice it fell my lot to receive many foreign bodies in the eyes. I soon discarded the route through the anterior chamber and resorted to the most direct route feasible, with much better results. I wish to emphasize one point: use a flat tip to insert through the scleral wound. I use a closed Knapp scissors (whose blades are flat) attached to the magnet, inserting through the scleral wound, with current on, on removing, and rotate about 90° to separate the lips of the scleral wound. This maneuver will in some instances prevent losing the foreign body.

Dr. Brown (closing).—Although Dr. Hill, after reading a copy of this essay, upon my invitation to open the discussion, informed me that he was in considerable disagreement with my paper and suggested that I might prefer to have someone else, more in agreement, open the discussion, I am happy that I did not release him and that you have heard an opposing side as well as my own set forth, in that it now is much easier for me to elaborate upon the main points of my paper.

The hand magnet, I have found, is useful only in those cases of small fragments of magnetic metal, which are near the surface and when the patient has come under treatment within 24 to 48 hours following the injury, before exudates are formed. The giant magnet, of course, can be converted into a hand magnet with the Victor flexible attachment.

It is obvious that small fragments of magnetic metal, located near the wall, can be removed through the posterior route. However, it is inadvisable to remove larger ones deeply seated through the posterior route because the retinal detachment which usually follows such procedure renders the eye sightless.

To elaborate the method of Haab (anterior chamber route), advocated in this paper, small pieces of broken surgical needles were inserted posteriorly into 25 fresh pigs' eyes near the entrance of the optic nerve and pushed into the eyeball, after which the technic described in this paper was employed. After the foreign bodies were drawn into the anterior chamber the eyes were sectioned and in no case was the lenticular capsule or lens injured, the piece of steel having passed around the lens.

Many ophthalmologists have made radiological studies in borderline cases. The usual procedure, however, is to make a series of pictures with the eye turned in different positions for each picture (not the double exposure method made on one plate). By comparing the separate pictures they have determined the location of the foreign body. And why? Did they not have absolute confidence in the Sweet method?

It was my purpose to place a simple and accurate diagnostic method in the hands of all ophthalmologists without any intent to discredit Dr. Sweet's work or his method, which requires, as you know, expensive and intricate apparatus, which is infrequently used and impractical in the equipment of the eye specialist or radiologist in other than great industrial and medical centers.

Verhoeff prefers the anterior route after thirty years' experience, believing it to be the safest procedure.

Statistics from the Herman Knapp Memorial Eye Hospital, as reported by Walter F. Duggan in 1933, show 30.6 per cent retinal detachments following scleral wounds and only 4.7 per cent in cases without scleral wounds, accidental or operative.

PATHOLOGY OF SICKLE CELL ANEMIA*

By L. W. DIGGS, M.D.,
and
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Memphis, Tennessee

Surveys have shown that about 8 per cent of all negroes inherit the sickle cell trait, an anomaly characterized by the capacity of erythrocytes to assume multipointed bizarre forms when sealed under a coverslip. This peculiarity is transmitted as a dominant characteristic. Most of the individuals with the trait have no other demonstrable abnormality, but within this group a few develop sickle cell anemia. The term "sicklemia" is used to designate the condition in which the sickle cell trait is present in the absence of the specific hemolytic anemia.

In the scattered literature dealing with the sickle cell phenomenon, now consisting of over 80 articles, the clinical features have been more carefully worked out than have the pathological. The literature dealing directly with the pathology of the disease consists of 13 fairly complete[1 9] and 7 incomplete[10 15] autopsy reports, the descriptions of 9 surgically removed spleens[15 22] and noteworthy articles of a summary nature by Steinberg,[23] Graham and McCarty[24] and Sydenstricker.[25] In addition there are available brief notes on the tissue changes in sicklemia.[1 6 24 29]

In attempting to formulate a clear-cut picture of the essential pathology from the reported cases, certain difficulties become obvious. The distinction between the non-anemic, mildly anemic and severely anemic cases is not sharply drawn. The relative paucity of adequately observed and recorded cases leaves the picture incomplete in places. The progressive nature of the pathological processes and the frequency of complicating diseases obscure the detail.

Because the knowledge concerning the tissue changes in sickle cell anemia is meager and the facts that are known are poorly disseminated, and because confusion exists as to their interpretation, we feel justified in presenting the subject again and stating our concept.

At the Memphis General Hospital we have had the opportunity to observe twenty cases of severe sickle cell anemia, four of which have been autopsied, and through the courtesy of Dr. Steinberg and Dr. Bothe have been allowed to study material from their cases. In addition, 30 autopsied cases of sicklemia have been examined. An analysis of the recorded data and the findings in our cases constitute the basis of this paper.

The tissue changes in sicklemia are not striking enough to be noticed in the usual pathological study.[6 28] The changes that are found and described vary in degree and in general are similar to those found in the early cases of sickle cell anemia.[24 25] The most constant features of the pathology are the presence of sickled cells and the vascular abnormalities of the spleen. The sickle cell deformity is best demonstrated in sealed moist preparations examined hours after making, but this method is subject to variations. In air exposed smears the deformity is not demonstrable; in formalin fixed tissues the typical pointed and curved elongation is usually unmistakable. In cases where the distortion is not marked there is considerable difficulty in distinguishing the sickled forms from the usual poikilocytosis produced by pressure and shrinkage. In one of our cases, proved before death to have the sickle cell trait, the deformity was not demonstrable in the tissue sections.

The splenic changes most commonly found in sicklemia are congestion of the pulp, dilatation of the capillaries and pools of blood in the marginal region of the Malpighian bodies.[29] These findings are present in the majority of cases, and are characteristic when found, but the failure to demonstrate them does not rule out the presence of the sickle cell trait. On account of the lack of fibrosis and the absence of marked pigmentary changes, it is possible that the splenic congestion is not present during the entire life of the patient, but that the sickling of erythrocytes occurs at the time of death due to anoxemia, and the congestion of the spleen results from the distorted shape of the cells.

Marked enlargement or atrophy of the spleen, or evidences of increased red blood cell destruction, are not features of sicklemia. Borderline or transitional cases occur in which the pathology simulates the changes found in severe cases. Clinically, cases have been observed to pass from the sicklemia phase to active anemia and back again. Pathologially, one is forced to acknowledge the existence of intermediary processes. Advance in knowledge will probably be thwarted by adhering too closely to boundary

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*Read in Section on Pathology, Southern Medical Association, Twenty-Seventh Annual Meeting, Richmond, Virginia, November 14-17, 1933.

*From the Department of Pathology, University of Tennessee, Pathological Institute.

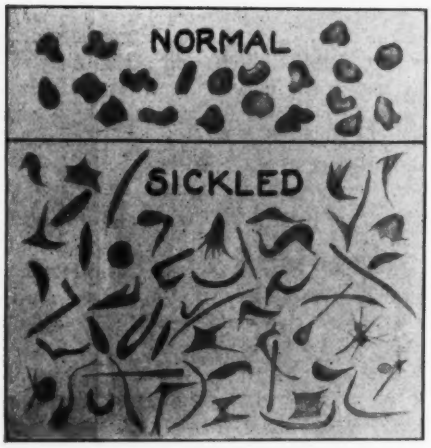

Fig. 1
Diagrammatic drawing showing the shape of sickled erythrocytes as compared with normal. Preparation from macerated formaldehyde fixed tissue.

lines, although a clear concept of the extremes is necessary for understanding of the disease.

The pathology of unquestioned cases of sickle cell anemia is clear-cut and distinctive.

The presence of sickled cells is the most striking feature. These may be demonstrated in ordinary blood smears, but in many cases the typical forms are few in number. In moist preparations the oat and crescent forms become more elongated and the round cells assume bizarre and spiculate shapes similar to those found in sicklemia. In fixed tissues the sickling deformity is variable. Formaldehyde is a better fixative for the preservation of the distortion than is Zenker's solution, which tends to cause the erythrocytes to round up. With a given fixative, the degree of distortion varies in different patients, in different organs and in different blocks of the same tissue. The deformity is likely to be most marked in the spleen, the liver, and the bone marrow. The shape usually assumed in tissues is the narrow pointed rod or elliptical cell, but curved, angular and barbed cells are likewise characteristic. Often the cells are from 30 to 50 microns long. Preparations made from macerated fixed tissue enable one to study the peculiarities of shape better than in sections (*Fig. 1*).

The next conspicuous feature of sickle cell anemia is the prominence of capillaries, which are dilated and filled with sickled cells, giving the appearance of packing under pressure. This phenomenon is particularly striking in the organs of the reticulo-endothelial system, the kidney, and the lung, but is a common finding in all tissues. A possible explanation of the capillary engorgement is that the elongated and spiked cells interlock and pass with more difficulty through narrowed spaces than do normal cells. Experimental confirmation of this tendency to mat together is found in the test tube, where difficulty of resuspension of centrifugalized blood is encountered. The demonstration of auto-agglutination has been claimed[1 30] and may be an additional factor. Since the distortion is increased under conditions of anoxemia, it is reasonable to assume that it will be greatest in tissues where there is stasis. The sudden pains experienced by patients with sickle cell anemia, which often disappear as mysteriously as they come, may in part be explained by this capillary blockade.

Closely related to the shape of the sickled cells and to the capillary stasis is a tendency to thrombus formation[7 11 23] and to infarction.[2 4 6 7 23] The organs most involved are the spleen, lung and kidney. In our autopsy material thrombi have been demonstrated in the pulmonary and splenic arterioles, and multiple infarcts have been noted in the spleen. One of our patients was admitted with the complaint of priapism, and when the acute engorgement subsided, there was definite residual fibrosis. Additional indirect evidence in line with the idea of thrombosis as an essential feature is the increased platelet count, the leukocytosis, the fever and the painful crises which these patients experience.

Anemia and jaundice of a hemolytic type are always present and their demonstration is necessary for the diagnosis of sickle cell anemia. Evidences of increased red blood cell destruction are found in the following facts: active phagocytosis of erythrocytes occurs in the peripheral blood and in the reticulo-endothelial system; pigment deposits giving the reaction for iron are found in the liver, bone marrow, lymph nodes, spleen and kidney; there is urobilin in the urine in the absence of bile, the direct van den Bergh reaction is delayed, and the pigment excretion by the liver is increased.

The blood picture of sickle cell anemia is highly characteristic. The essential features are: sickled erythrocytes, anemia of the normocytic normochromic regenerative type, leukocytosis, thrombocytosis, increased resistance of erythrocytes to hypotonic salt solutions, and normal bleeding and clotting time.[31]

The gross and microscopic appearances of the various tissues are as follows: the habitus is va-

riable, but there is a tendency for adults with the disease to be tall and slender, with long extremities, narrow hands and feet, tapering digits, high skull, prominent abdomen, and poorly developed muscles and sexual characteristics. There is pallor of the mucous membranes and the sclerae are greenish yellow. In many cases there is a moderate general lymph node enlargement, but this is not a constant or a diagnostic feature. Papillary atrophy of the tongue, ulceration and necrosis of the mucous membranes, hemorrhage and purpura are not a part of the picture.

Chronic leg ulcers or scars of old ulcers are present in about three out of every four adults with the disease, but are infrequent in young children. The average age of patients at the time of the appearance of the ulcers is 15 years. The common site is the lower half of the leg on the anterior surface or around the ankle. The ulcers are often large and may be multiple and bilateral. The characteristic lesion is a shallow depressed erosion, oval or round in shape, with a flat, grayish granulating base and a smooth, slightly elevated margin (*Fig. 2*). The amount of exudation is usually slight. The surrounding superficial vessels are dilated and there is proliferation of the underlying periosteum. Microscopically the picture is that of an ordinary chronic inflammation. At the periphery of the fibroblastic area the capillaries are engorged with sickled cells, and this is perhaps the only characteristic feature. On healing, the surface is covered with a thin layer of depigmented epithelium.

Clinically, organic heart disease is often suspected, but at autopsy there are no constant cardiac changes except those explainable on the basis of anemia. The heart is moderately enlarged, the myocardium pale and flabby. On microscopic examination fatty degeneration and moderate scarring are noted.

With the exception of sickled cells and the increased frequency of thrombi and infarcts, the lung presents no unusual features. Pneumonia and tuberculosis are frequent.

The liver in sickle cell anemia is enlarged. The consistency and color are variable, depending on the amount of fibrosis, congestion, degenerative changes and pigmentation, but the usual description is that of a firm organ, dark mahogany in color, with a smooth capsule. Microscopically, the most striking feature is the wide distention of capillaries with tightly packed sickled cells. The polygonal cells appear compressed and atrophic. The Kupffer cells are

Fig. 2
Chronic sickle cell anemia leg ulcers.

greatly enlarged and distend the capillary lumens. They are actively phagocytic, containing many sickled cells and pigment which may or may not give the iron reaction. Granular and fatty degeneration of the parenchymal cells, usually most marked in the center of the lobule, is a common finding. Iron and iron free pigment are present in varying amounts in the liver cord cells and they have a patchy distribution. The interlobular reticulum is increased and periportal fibrosis and round cell infiltration of a moderate degree are the rule. Advanced cirrhosis or evidence of chronic portal hypertension have not been observed. Stasis of bile is rarely noted. Gallstones have been found in 3 of 18 cases.

The splenic pathology of sickle cell anemia is characteristic and consists of a series of progressive changes from congestive enlargement to fibrotic atrophy.

Large spleens are more likely to be found in infancy. The average weight of the spleen in 8 children under 5 years of age was 240 grams. The largest spleen recorded, weighing 621 grams,[20] was removed from a boy aged 4 years. The average weight of 25 spleens from patients over 5 years of age was 70 grams. Atrophic changes may occur quite early. Spleens weighing less than ten grams have been found in young children.[1 3] That fibrotic atrophy may completely obliterate the spleen is now an estab-

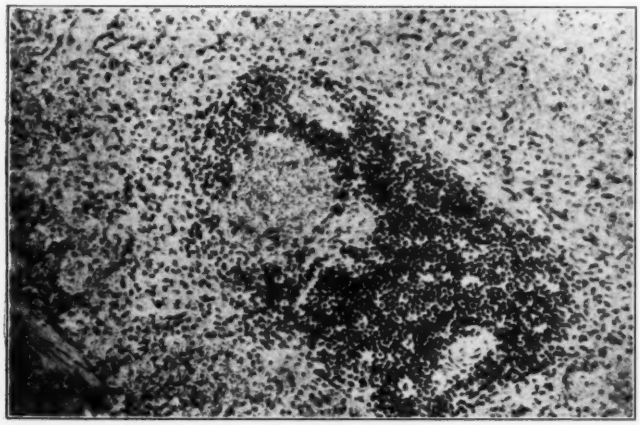

Fig. 3

Spleen from early case of sickle cell anemia showing marginal pool of blood in Malpighian body. Photomicrograph x 300.

lished fact. In a 51-year-old man examined by us no remnant of spleen could be found at autopsy. Steinberg[23] noted in a 49-year-old woman a spleen weighing 2.4 grams. Splenomegaly occurring in adults with the disease suggests that the tissue changes developed slowly in such cases or that the initial activity was acquired in the later years of life.

The usual picture of the spleen representative of the early stage is an enlarged, firm, dark, purplish brown organ. The lymphoid aggregates are small, their germinal centers absent and their capillaries are distended with sickled cells. The pulp is intensely congested and there are great pools of blood in the neighborhood of the atrophic Malpighian bodies (*Fig. 3*). Most of the sinuses are compressed, but they may be distended with cells or dilated and empty. There is no hyperplasia of the reticulo-endothelial elements and the occasionally demonstrable phagocytosis of erythrocytes is limited to the free mononuclears or fixed cells of the pulp. Both iron and non-iron containing pigment in the form of yellow and brown granules are present in moderate amounts, free and in the phagocytic cells. Infarcts are common.

The spleen representative of a more advanced stage of the process is smaller than normal, firm in consistency and nodular in outline. It is dull gray in color and bound by adhesions. On section the cut surface is smooth, the capsule is thickened, and the red brown pulp is partitioned off by bands of fibrous tissue, in which there are whitish and yellow brown streaks. In microscopic sections the remains of the splenic pulp have the appearance of great pools of sickled cells intermingled with myeloid and reticular cells. In the areas of organizing hemorrhage there is a most varied and colorful picture, giving the typical appearance of the siderotic nodule. In these areas, and particularly around the central artery of the now replaced lymphoid aggregations, there is fibrous tissue organization which takes the form of peri-arterial fibrosis, in which iron and calcium are deposited in large amounts (*Fig. 4*), and yellow and green pigment granules, greenish masses in the form of flakes or bamboo-like rods and ill-formed yellowish crystals are mingled. Giant cells are frequent and may contain pigment. Iron and calcium deposits and pigment granules are also conspicuous in the vessels of the trabeculae and in the capsule. There is apparently little change in the endothelium of the larger vessels, and thrombosis of the splenic artery and vein has not been noted. However, in the smaller arterioles there are endothelial hyperplasia, subintimal hyalinization and in some cases degenerative changes with necrosis, cellular infiltration and thrombi.

In the later stages of the process, the spleen

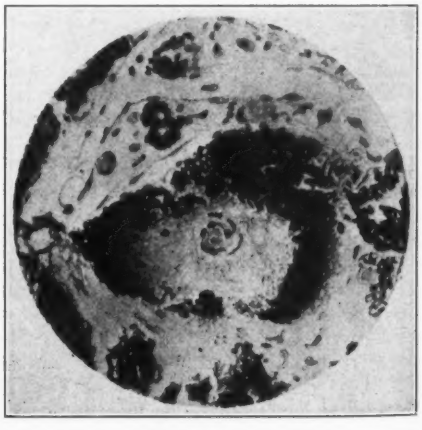

Fig. 4

Drawing from atrophic spleen showing periarterial fibrosis and iron and calcium deposition, hematoxylin-eosin stain. High dry magnification.

is a shriveled mass embedded in adhesions. It is exceedingly firm and cuts with difficulty, the knife encountering gritty particles. On section the wrinkled capsule is very thick, and fibrous tissue has replaced the splenic pulp. Flecks of pigment may be seen. Microscopically, the pulp and Malpighian bodies are no longer existent, and all that remains is a distorted mass of fibrous tissue, pigment, and blood vessels with tremendously thick walls in which iron and calcium incrustations are conspicuous.

The bone marrow in sickle cell anemia is grayish to dark red in color, and the fat is practically replaced by the actively regenerating cells. Congestion of the capillaries and the reticular spaces with sickled red blood cells is a striking feature. Primitive and intermediate cells of the granulocytic series are more in evidence than are the islands of megaloblasts and nucleated red blood cells. Sickled nucleated erythrocytes are demonstrable. Eosinophils and lymphocytes are scattered throughout and megalokaryocytes are conspicuous. Phagocytosis of red blood cells is not marked. Pigment, which gives the positive reaction for iron, is present in small quantities in the endothelial cells, and in the phagocytes. The reticulum is increased, and in some sections there are fibrosis and abnormal calcification.

The studies of bone other than the marrow proper have been limited. The only detailed description was given by Graham,[2] who observed, in a 30-year-old man, marked evidence of extensive intra-osseous tissue destruction and reparative processes, intermingled with marrow hyperplasia. Roentgen ray studies have revealed bony changes comparable to those found in erythroblastic anemia and in hemolytic jaundice, namely: osteoporosis, increased prominence of trabeculae and alterations in the relation of marrow cavity to cortex. These changes are not found in all cases of sickle cell anemia, are not striking in most cases, and are variable in character. The explanation usually given for the changes found in congenital hemolytic anemias is that the hyperplastic marrow replaces true bone, but it is possible that in sickle cell anemia there is an additional factor of tissue destruction and healing with fibrosis and calcium deposition.

Phagocytized erythrocytes and pigmentation are found in the lymph nodes. Engorgement of the capillaries and fibrosis have been observed.

The kidney lesions found in typical cases of severe sickle cell anemia are the congestion of the small blood vessels, pigmentation and scarring. The glomerular capillaries and tubular arterioles are stuffed with erythrocytes, causing them to stand out in the gross as dark purple dots or streaks against a lighter, browner background. In the epithelial cells of the convoluted tubules and to a less extent in the cells of Henley's loop and collecting tubules there are granules of amorphous pigment, yellow to dark brown in color. These pigment accumulations are scanty in some cases, but in others are so marked (*Fig. 5*) as to give to the organ a rust brown color. They are usually found in scattered areas and give a variable reaction for iron. Degenerative and proliferative changes in the kidney are absent or minimal in the early or mild cases, but in the cases of long standing are so constantly found that they are a part of the picture.

The spinal cord and brain have been inadequately studied and no statement is justified concerning the changes found. Sensory and motor disturbances, headaches, nausea and vomiting and signs of meningeal irritation are frequently mentioned in the clinical reports, and subarachnoid hemorrhage has been noted in one autopsied case.[12]

In so far as the material has been studied,

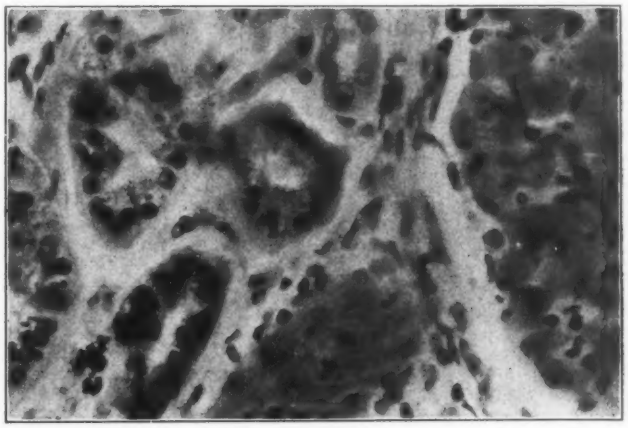

Fig. 5
Pigmentation in convoluted tubules of kidney. Photomicrograph x 750.

there are no peculiar lesions in the intestinal or urinary tracts. The bone changes and the body habitus suggest the possibility of alterations in the endocrine system, but no changes other than retarded development of the genital organs are noted. There is no generalized visceral pigmentation resembling hematochromatosis such as is found in erythroblastic anemia.

Blood cultures taken before death are usually negative. No organism has been consistently found at autopsy, but pneumococci and streptococci are the most frequently encountered.

The cause of death in sickle cell anemia is usually some infection, of which tuberculosis and pneumonia are the most frequent, but cases are on record in which the anemia alone was held responsible.[6 7 9] The expectancy of life is greatly reduced, the majority dying before the age of 30, with the highest incidence of death in the first decade.

Sickle cell anemia has many points in common with erythroblastic anemia, hemolytic jaundice and pernicious anemia. The outstanding differences are that sickle cell anemia is practically confined to the negro race, sickled cells are present and the splenic pathology is specific.

SUMMARY

(1) Sickle cell anemia is practically limited to the negro race and develops within the group of those inheriting the sickle cell trait.

(2) The sickle cell trait in absence of anemia is detectable in tissue sections by the presence of sickled cells and by the congestion of the splenic pulp with dilatation of the capillaries in the region of the Malpighian body.

(3) Anatomical evidence indicates the existence of transitional stages between the sickle cell trait and severe sickle cell anemia.

(4) The essential features of the pathology of sickle cell anemia are:

(a) Sickled erythrocytes, congestion of capillaries, thrombi, infarcts, fibrosis.

(b) Hemolytic anemia with increased phagocytic activity of the reticulo-endothelial system, retention jaundice, pigment deposits in the liver, spleen, bone marrow, lymph nodes and kidney; hyperplasia of the bone marrow, regenerative blood picture, degenerative visceral changes.

(c) Other noteworthy tissue changes: splenic congestion early, followed by hemorrhage, infarction and fibrosis with siderotic nodule formation and atrophy late; hepatomegaly with prominent Kupffer cells; congestion, pigmentation and scarring of the kidney; cardiac enlargement, leg ulcers, bone changes.

(5) The expectancy of life in sickle cell anemia is less than 30 years. The highest incidence of death is in the first decade. Pneumonia, tuberculosis and other infections are common complications, but death may be due to the anemia alone.*

*The photographs used in this paper were made by Mr. Joseph L. Sciani, Art Department, Pathological Institute, University of Tennessee.

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DISCUSSION (*Abstract*)

Dr. R. D. Baker, Durham, N. C.—Dr. Diggs spoke of maceration in making preparations from tissue which had been removed at operation or postmortem. I wish to ask what he means by maceration in this connection and the exact procedure followed.

Dr. Diggs (closing).—Sickled erythrocytes may be demonstrated in fixed tissue by macerating a bit of tissue in a mortar and making a thin, moist preparation of the cell suspension.

The sickle cell trait has been found in white people in whom there was no evidence of negroid features or knowledge of negro ancestry. The possibility of racial admixtures is great, and the absolute purity of

a racial stock is impossible to prove. However, it is wrong to assume that the anomaly developed in one individual negro and that the process is incapable of development in other individuals in other parts of the globe. Surveys of the incidence of the sickle cell trait are indicated in different parts of the world and in different species.

All patients with sickle cell anemia are not tall and slender, but in our series the tendency has been striking enough to warrant comment. It is probable that the anemia is not responsible for the habitus, but that the factors for the development of the anemia are related to a given habitus or that the disease has been predominantly transmitted by a tribe with that body build. To the anthropologist and to the student of inheritance, the disease presents interesting fields for investigation. The pathologist and the c'inician, likewise, will find in sickle cell anemia numerous problems the solutions of which will be advances in the field of hemolytic and congenital anemias.

PATCH TESTS IN THE DETERMINATION OF ARSPHENAMINE SENSITIZATION*

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It is now generally agreed by all who have studied the question that certain types of post-arsphenamine dermatitis, notably the vesicular and exfoliative eruptions, are due to sensitization of the patient to the drug; that in such individuals, further use of arsphenamine or its closely allied chemical derivatives will produce a second and perhaps more serious attack of dermatitis; and that this sensitization appears to be permanent. Certain other post-arsphenamine dermatitides do not appear on clinical grounds to be due to sensitization. At least, to some patients, notably all those with urticarial and herpetic rashes, and a part of those with erythematous or scarlatiniform eruptions, further arsphenamine may be administered without grave danger. The clinical differentiation of sensitized and non-sensitized patients is, however, often difficult; the morphologic characteristics of the eruptions in one group tend to shade over by almost imperceptible gradations into those of the other. For this reason, a search has for some time been in progress for a simple skin test, intradermal, scratch, or patch, by which sensitized patients might be readily recognized, and in them the danger of further arsphenamine therapy be avoided; while conversely, more arsphenamine might be safely administered to a demonstrated non-sensitive individual who might, because of his syphilitic infection, need it badly.

In 1931, we[1] undertook to evaluate the intradermal test for detecting the potential reactivity of patients to the arsphenamines. Normal individuals, non-syphilitic hay fever patients, non-reactive syphilitic patients under arsphenamine treatment, and patients whose sensitization to the drug had been manifested by one or more attacks of post-arsphenamine dermatitis, were tested. It was found that intradermal tests were of no practical value for the demonstration of sensitization, since these tests were often positive in non-syphilitic controls, and often negative in patients known to be arsphenamine-sensitive. In addition, Frei[2] and Sulzberger[3] demonstrated, by experiments in human beings and animals, that intradermal injections of arsphenamine might actually produce sensitization, and thus predispose the patient to the development of arsphenamine dermatitis.

Meanwhile, other workers were studying the applicability of patch tests to the demonstration of arsphenamine sensitization. Chargin and Sulzberger[4] performed patch tests in 293 non-syphilitic and 210 syphilitic individuals (the latter tested before any treatment) and found them positive in 17 and 21 per cent, respectively. They further observed that two patients with negative tests nevertheless developed post-arsphenamine dermatitis after subsequent treatment. Not discouraged by these results and by the fact that he himself had previously[5] found that 6 per cent of non-sensitive patients gave weakly positive patch reactions with neoarsphenamine, Schoch,[6] in 1932, published a report based on 8 cases of post-arsphenamine dermatitis, in which he concluded that

> "The patch test with neoarsphenamine may be relied on to permit, if negative, or to interdict, if positive, further arsphenamine therapy in patients who have recovered from arsphenamine dermatitis."

This conclusion is so important to the conduct of antisyphilitic treatment as to require review.

THE MATERIAL OF THIS STUDY

Accordingly, we have made patch tests with the arsphenamines in 165 individuals. Of these, 22 were non-syphilitic controls (physicians, students, social workers, and so on); 54 were syphilitic patients, all of whom had received or were

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*From the Syphilis Division of the Medical Clinic, the Johns Hopkins Hospital.

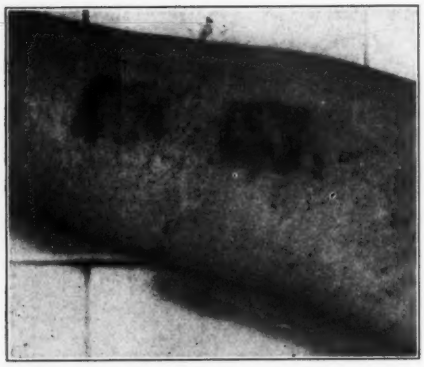

Fig. 1
Positive patch test in normal control.

receiving arsphenamine treatment without reaction; 18 were syphilitic patients who had developed a previous post-arsphenamine jaundice; and 69 were individuals who had had a previous post-arsphenamine dermatitis.

THE METHOD OF TESTING

In all patients, tests were made with a 30 per cent solution of neoarsphenamine. In most instances, tests were also made with two other arsenical drugs now under investigation as to their therapeutic activity in syphilis. One of these drugs is an oxidation product of arsphenamine; the other is a trivalent arsenical product which is less closely related from the chemical standpoint. Each of these products, which will be referred to hereafter as drug A and drug B, respectively, were used in 3 per cent concentration. Two patients were also tested with tryparsamide, using a paste of this substance made by mixing 1 gm. with 0.5 c. c. of distilled water; one of these individuals had had a fixed dermatitis due to tryparsamide. In one patient, in addition to all of the aforementioned products, a test was also made with Fowler's solution. Arsphenamine itself was not employed because of the irritating properties of the alkaline solution; the use of silver arsphenamine and sulpharsphenamine was also omitted because, in this series, they had rarely been responsible for the previous dermatitis.

Pieces of old sterile linen about 2 cm. square were soaked in the various solutions, applied to the skin while wet, and each was covered with a piece of cellophane. This in turn was sealed at the margins with narrow strips of adhesive tape. Most of the tests were observed 24 hours later, a few were seen at 6 and 24 hours, and a few at 48 and 72 hours. All patients were instructed to report any reactions occurring before or after the regular observation time.

Results were read as negative when the skin underlying the linen square was normal or only slightly reddened; as moderately positive if there was erythema and swelling with an occasional papule, vesicle, or both; and as strongly positive if there was an acute dermatitis with marked erythema, swelling, and vesiculation.

THE RESULTS OF THE STUDY

Of the 22 normal individuals used as controls, patch tests were negative in 14, moderately positive in 5, and strongly positive in 3. Two of these latter 3 persons were tested a second time nine months later, with negative results in both. One of those with a moderately positive reaction was likewise negative to a second test nine months later; and in one patient originally negative, a second test one month later was also negative. In none of these normal persons has the subsequent therapeutic use of arsphenamine become necessary.

Fifty-four patients with syphilis, none of whom had had any serious arsenical reaction, were tested. All of these individuals had received or were receiving an arsenical drug at the time of testing. Of the group, 43 were com-

Fig. 2
Positive patch test in a post-arsphenamine dermatitis.

pletely negative; 8 showed moderately positive, and 3 strongly positive reactions. To all of the 11 patients with positive reactions, further intravenous arsphenamine was given after the test. In one (an individual whose patch test was positive on two occasions nine months apart), a mild exfoliative dermatitis developed from an injection of neoarsphenamine given after the second positive test. No other untoward reactions have so far been observed. Repeat patch tests have been performed at varying intervals in 13 individuals in this group, in 4 of whom the original test was positive, in the remainder negative. The results of the second test were negative in all except the one reactive patient just mentioned.

In 3 of these 54 non-reactive syphilitic patients, an arsphenamine had been extravasated into the tissues 3, 4 and 8 months previously, with a resulting severe inflammatory reaction and scarring. Patch tests were negative in all, though one was strongly positive to the adhesive tape control.

Eighteen patients who had had a previous post-arsphenamine jaundice without dermatitis were tested as a further control measure. In all, the results were negative.

Particular interest attaches to the 71 patients who, during the course of arsphenamine therapy, had reacted with mild, moderate or severe exfoliative dermatitis,* because of the implication that in such cases the patch test is of value for determining the possibility of further arsphenamine therapy. That the previous eruptions in these patients were due to sensitization had already been demonstrated, in most instances, by cautious intravenous testing (Moore)[7] with minute doses of arsphenamine, which had resulted in a mild second attack of generalized dermatitis. We have purposely omitted from the study patients whose previous skin manifestations were of the herpetic or urticarial type, since it is generally agreed that these types of dermatitis do not respond to a percutaneous test. Patch tests were performed at intervals ranging from 3 months to 17 years after the subsidence of the generalized dermatitis. Of the entire group of 71 patients, 55 were negative (in 9, a repeat test was also negative). Sixteen of the group responded with a positive test, but only 11 of these were strongly positive. Patch tests were subsequently repeated in 5 of the 16 positive patients, on from two to five occasions; in one, repeat tests were negative, in the others they remained positive.

To 4 members of this group who reacted with strongly positive patch tests, we purposely administered intravenously 0.1-0.2 gm. of neoarsphenamine. All developed a mild to moderate generalized dermatitis. In one patient who reacted strongly to neoarsphenamine and drug A, patch tests to drug B were negative. Nevertheless, an attempt to administer intravenously a therapeutic dose of drug B was followed within a few hours by cutaneous burning and flushing and the next day with moderate itching, which we interpret as sensitization to this drug also. The incidence of positive and negative patch tests with neoarsphenamine in the various groups of patients studied is summarized in *Table 1.*

Table 1

THE INCIDENCE OF POSITIVE PATCH TESTS TO NEOARSPHENAMINE IN VARIOUS GROUPS OF PATIENTS

	Number of Cases	Results of Patch Test: Negative	Moderately Positive	Strongly Positive
Normal controls	22	14	5	3
Syphilitic patients treated, but no dermatitis	51	40	8	3
Syphilitic patients who had had post-arsphenamine jaundice	18	18		
Syphilitic patients with arsphenamine infiltration of the tissues	3	3		
Post-arsphenamine dermatitis	69	54	5	10
Non-syphilitic patients with post-arsphenamine dermatitis	2	1		1

Included among these 71 patients are three individuals with fixed dermatitis, one each due to arsphenamine, neoarsphenamine, and tryparsamide. In these three patients, patch tests were negative in all, confirming Sulzberger's[8] opinion that in this type of drug eruption patch tests are of no value. That fixed dermatitis may, nevertheless, be a precursor of generalized sensitization in the face of a negative patch test is illustrated by the following experience:

J-31707.—During antisyphilitic treatment in South Carolina, this patient had developed a fixed arsphenamine eruption entirely localized to the palmar surfaces. A negative patch test was obtained twice at intervals of two weeks. On the basis of these negative tests, arsphenamine was administered, beginning with

*Two of these 71 patients were non-syphilitic and were treated elsewhere with an arsphenamine because of lichen planus and Vincent's angina, respectively. The individual with lichen planus had two attacks of exfoliative dermatitis, one due to neoarsphenamine, one to bichloride of mercury. Patch tests with both of these substances were positive.

0.1 gm. and increasing to 0.4 gm. After the third injection, the patient complained of generalized itching, and a fourth and fifth injection was each time followed by a mild, generalized, erythematous eruption.

To illustrate further the non-specificity of patch tests with arsenical drugs, and incidentally the persistence of arsphenamine sensitization over a 17-year period, I report briefly the following instance:

H-24207.—This patient with syphilitic osteomyelitis was first seen in February, 1916. At that time, after the sixth injection of arsphenamine, 0.3 gram each, she developed severe itching and twelve hours later a moderate dematitis which gradually progressed to such severity that hospitalization was deemed imperative. Due to an oversight, she was again given an injection of 0.3 gram of arsphenamine three months later, with the result that a second severe dermatitis ensued and hospitalization was again necessary. Twelve years later, in 1928, in the course of intradermal tests, this patient reacted with a mild, generalized dermatitis upon receiving intradermally one drop of a 1:6400 dilution of arsphenamine. In 1933, seventeen years after the original dermatitis, this patient reacted very strongly to patch tests with neoarsphenamine, drug A and drug B. As she also reacted with a positive test to tryparsamide, a pentavalent arsenical, a patch test of U.S.P. postassium arsenite 10 per cent solution was applied. This produced a moderately positive reaction in twenty-four hours, suggesting that the patient is sensitive to arsenic in any form.

SUMMARY AND CONCLUSIONS

(1) In a patient who is known to be arsphenamine sensitive, a positive patch test with neoarsphenamine is confirmatory evidence of persistence of sensitization. Nevertheless, the patch test is of no practical value for the demonstration of arsphenamine sensitization, since it is sometimes positive in normal individuals and often negative in those known to be arsphenamine sensitive.

(2) The continuance or interruption of arsphenamine therapy in a patient who has suffered from a post-arsphenamine dermatitis cannot be predicated on the results of a patch test.

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DISCUSSION (*Abstract*)

Dr. J. Richard Allison, Columbia, S. C.—The paper of Dr. Robinson should be of value to all who treat syphilis and to those who depend on allergic reactions for guidance in treating allergic dermatoses. It is my belief that our present knowledge of allergy, hypersensitization and anaphylaxis does not warrant the definite interpretations that are being placed upon allergic phenomena. Dr. Robinson's study and his conclusions as to the unreliability of the patch test as a guide in determining the possible sensitization of patients to arsenic is a proof of this statement. Investigations of this kind are valuable for two reasons: first, we are warned of the inadequacy of the patch test as a definite guide, and second, such studies may lead to some more reliable tests to be used in the future. Skin tests such as the patch, scratch, and the intradermal (the usual method of testing in hypersensitiveness) will often lead to errors in both diagnosis and treatment, when we depend entirely on the reactions for guidance. Dr. Robinson's study bears out this statement. Therefore we must still rely on a careful history, examination for the presence of skin rash, and finally the administration of small doses in suspected cases in order to prevent severe arsenical dermatitis.

Dr. E. Myles Standish, Hartford, Conn.—I am sure that we all agree with his careful, conservative presentation. In a case of mine in which a patient developed a neoarsphenamine dermatitis and the patch test was found positive, several years later a small dose of neo evoked intense pruritus and a beginning dermatitis. Furthermore, at the present time, about ten years after the exfoliative dermatitis, the patch test is still positive and the individual is still sensitive to both arsenical and bismuth compounds. This proves conclusively to my mind that a patch test is a good indicator of sensitivity.

Dr. Robinson (closing).—The question as to whether a sensitization may be brought about by a patch test may be answered, I think, by reporting that but one of the negative patients has ever become positive, although this piece of work has been going on for over a year, and most of our patients are still under observation.

We are quite convinced that this reaction is of the sensitization type and not toxemic as suggested, and that continued reaction does not rest upon the amount of arsenic retained by the patient.

Finally, I wish to repeat that we have found that, in our hands, with extreme care, intravenous testing is satisfactory and more certain of determining sensitivity than either patch, scratch or intradermal testing. It is understood, of course, that only a very small portion of a therapeutic dose is to be used in this test.

THROMBOPHLEBITIS MIGRANS*

WITH REPORT OF TWO FATAL CASES WITH AUTOPSIES; ONE ALSO SHOWING PRIMARY CARCINOMA OF THE LIVER

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Thrombophlebitis migrans is apparently what the name implies, an inflammation of the veins, associated with thrombosis, that flares up and quiets down, only to reappear along the course of the same vein or in another vein more or less remote from the site of the previous attack. Under various titles it has been recognized and reported since the middle of the last century. Few of the patients afflicted have died of it. The opportunity to perform autopsies upon two patients, both of whom died as the direct consequence of the disease, justifies this report of the cases and discussion of the syndrome presented in the literature.

Case 1.†—Mrs. J. H., aged 60, while under treatment for hypertension and irritable colon, developed a series of phenomena attributed to thrombophlebitis. These varied from superficial phlebitis with complete resolution, through thrombophlebitis with residual fibrous cords, and deep thrombophlebitis with persistent edema to the fatal thrombosis of a mesenteric vein. Some of these attacks were short, some long. The dorsum of the left foot, skin over the left calf, and right leg were at different times affected. There were short attacks of palpitation with tachycardia, cough and sense of choking; deep pain in the left thigh; superficial phlebitis of the left leg; an anginal attack with chest pain, followed later by pains in both arms (but not chest), and very irregular pulse; marked and sudden edema of the right leg; red veins over the right thigh and gluteal areas with much pain; and red streaks on the left thigh, abdominal wall and left wrist; pain in the left upper quadrant of the abdomen, worse with respiration, cough and defecation; the right toe and foot swelled; there were severe pains in the knees and arms to the fingers; superficial thrombophlebitis of the right arm; phlebitis of the skin over the scapula and left chest and over the left triceps area; spots about the hips; right arm, right breast; numbness and weakness of the left side, arm and leg; scalp and neck; and finally mesenteric thrombosis. This series of disturbances extended over the period from August 28, 1930, to November 1, 1931, the date of death.

AUTOPSY FINDINGS (ABSTRACTED)

Autopsy was performed by Dr. N. E. Leake, November 1, 1931. Gangrene of about 12 inches of the mid portion of the small intestines was present. There was no intestinal obstruction. In the mesentery leading to this portion of the intestine was felt a hard firm cord, which proved to be a thrombosed mesenteric vein. The clot was not found attached to the vessel wall, though the dissection was carried out as far as possible. The arteries were not involved grossly.

No superficial areas of thrombosis or infarction were found in the heart. The vessels were not carefully traced out.

Microscopic Studies.—In the mesenteric veins (sections of larger and smaller veins) there was no inflammation of the vein wall. An intact clot was free in the lumen.

The mesenteric artery had a greatly thickened endothelium.

Case 2.—Miss N. W., aged 60, also having hypertension, suffered the following attacks: pain in the right heel followed by smooth edema to the knee; "drawing" pain in the left leg followed in two days by a thrombophlebitis of the skin in the left popliteal space; heartburn and bloating; thrombophlebitis; soreness of the right thigh, deep vein(?); thrombophlebitis of the skin of the right forearm; pain on respiration at the base of the left lung; edema of the posterior right thigh; edema of the left foot to the knee; two areas on the flexor surface of the right forearm; right leg swollen from groin to foot; attack of dyspnea and tachycardia; inner side of the right leg, above and below the knee; the right forearm again; dorsum of the right foot; deep tenderness and soreness from the right ankle to the mid thigh; a red streak over the left knee; a black stool, stools positive for occult blood; dorsum of the right foot; three fresh areas on the right forearm; indigestion, pallor, weakness, belching; black stool again; superficial gangrenous area on the dorsum of the right foot; liver palpable, with a mass and jaundice (hepatic thrombophlebitis diagnosed with the possibility of neoplasm); edema of the right leg; a blue streak, lower right back; vomitus, "coffee grounds" and free hydrochloric acid 30 degrees; drowsiness, weakness, and jaundice increasing. The course of the symptoms was from February 16, 1932, to May 8, 1932.

AUTOPSY FINDINGS (ABSTRACTED)

Autopsy was done by Dr. H. M. Jamieson May 8, 1932.

Liver.—The liver is much enlarged, extending about 3.0 cm. beyond the costal margin, and about 8.0 cm. to the left of the midline. It is irregular in outline and of a peculiar greenish-gray mottled color. It shows several depressed firm greyish white areas on the surface of the right lobe and some bullous greenish-yellowish areas over the left lobe. Gross section shows the right lobe to be profusely studded with areas strongly resembling carcinomatous deposits, varying in size from 0.5 to 3.5 cm. in diameter; some of the larger ones show a semi-fluid necrotic center. The right lobe shows numerous areas of greenish suppuration, apparently originating from the bile passages, and extending into the lobules. The bile passages themselves show numerous small rather flat black gallstones. The gallbladder is about 2½ times normal size and shows some adhesions on its serous surface. Its wall is about twice normal thickness and the lumen contains two large granular surfaced oval stones, 3.5 and 1.0 cm. in length, and innumerable small black facetted stones, in some rather purulent-looking thick bile.

The gastro-intestinal tract is apparently normal. It was carefully searched for malignancy.

*Read in Section on Medicine, Southern Medical Association, Twenty-Seventh Annual Meeting, Richmond, Virginia, November 14-17, 1933.

†Owing to lack of space the clinical histories are greatly abbreviated. Certain of the data are included in the discussion.

There is a marked arteriosclerosis throughout the circulatory system. The veins of the legs show signs of a recent rather acute inflammatory process, which has become chronic and persistent. In places there are fixed, partially organized clots, and in other places fairly well organized clots which are freely movable, and not adherent to the venous wall, indicating that the clot had first formed elsewhere.

Microscopic examination of the liver shows the right lobe to be the site of a profuse carcinomatous growth of the large, slightly granular type, indicating a primary carcinoma of the liver. The growth has been apparently rather slow, as there are relatively few mitoses. The left lobe shows abscess formation. Careful study of less involved sections shows that these originate in the periportal spaces and the earliest lesion was seen definitely to begin about a portal vein. The tissue in the center of many lobules showed degenerative changes, but no signs of inflammation.

The section of the femoral vein and artery *en bloc* shows a normal artery, but the vein's lumen is nearly half filled with an organized canalized thrombus attached to the wall. A section of a subcutaneous vein at the site of an early attack showed an organized canalized thrombus attached to the vessel wall. There was a superficial ulcer of the skin overlying this area.

Biopsy.—One portion of the vein contained a clot, several days old, partly organized, lying free in the lumen. Another portion showed the thrombus attached to the wall.

The cause of death was primary carcinoma of the liver, suppurative pylephlebitis, and hypostatic pneumonia.

The anatomical diagnosis was primary carcinoma of the liver, suppurative pylephlebitis, chronic cholecystitis with cholelithiasis, and chronic passive congestion of the spleen.

ETIOLOGY

The cause of thrombophlebitis is shrouded in obscurity. The multiplicity of factors suggested are of interest in indicating how groping have been the attempts to find the cause. Sir James Paget,[2] in 1866, found the condition associated with gout. Daguillon,[3] in 1894, described it in the "arthritic" diathesis in which he included migraine and eczema. Frémy, in 1864, said the cause was "the peculiar sedentary attitude required by the patient's trade" (the trade was not stated). The more modern attempts to demonstrate the etiological agent have been without result. In my own second case, blood cultures with incubation over long periods of time (6, 10, 14 days) were negative except once when on the eighth day a pneumococcus was present, but this could easily have been a contamination. A freshly involved vein was excised and divided in two parts, one of which was cultured aerobically, and the other anaerobically. After long incubation (19 days) these cultures remained sterile. Reports of blood cultures scattered through the literature are almost uniformly negative.

This does not mean necessarily that a bacterium is not the cause of the disease. It may mean simply inability on the part of the clinicians and technicians to grow the germ. There are many factors in favor of an infectious origin: (1) the widespread irregular involvement of veins in the body; (2) the frequent presence of low grade fever; (3) the leukocytosis, definite, though of moderate grade; (4) the increase in percentage of polymorphonuclear leukocytes with disappearance of eosinophils; (5) the gross signs of inflammation, heat, redness, swelling and pain; (6) the pathological picture of cellular infiltration about the involved veins.

Gros[4] considered the etiology obscure, but thought that la grippe might be the cause, and more recently Owen[5] ascribed it to influenza. Vaquez and Leconte[6] said that the condition seemed to attack those with varicosities and seemed to follow sometimes a minute wound or an insignificant erosion, and sometimes a generalized infection. This would not explain, they confess, the lesions of the arms without admitting a constitutional vulnerability. Infected thrombi were given by Desplats[7] as the cause, while McDonagh[8] thought the clots were formed by a "gelation" of the blood. Ellison[9] described the condition in association with scarlet fever; Hartfall and Armitage[10] thought focal infection was the portal of entry. Moorhead and Abrahamson,[11] in summarizing other possible causes

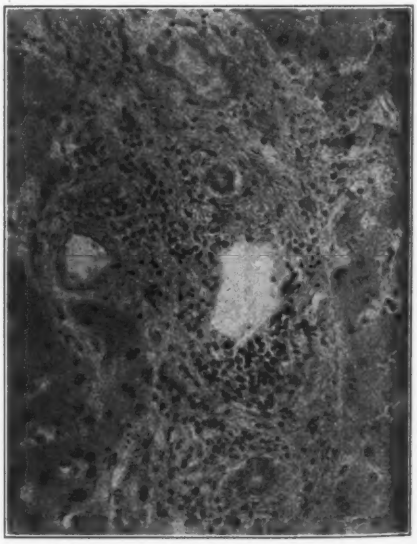

Fig. 1

that had been suggested listed syphilis, trauma, tuberculosis, rheumatism, toxic and cachectic illnesses. Krieg[21] lists a form of allergy as a conceivable mechanism. Some have suggested an association with cancer.

The uncertainty of the etiology and pathology of the condition is further manifested in the variety of names under which the disease is listed: phlébite des quatre membres (many French authors; phlébites multiples (Gros[4]); la septicémie veineuse subaguë (Vaquez et Leconte[6] and Legrand[12]; gouty phlebitis (Paget[2]); idiopathic recurrent thrombophlebitis (Briggs[13]); phlebitis migrans (Herrick[14]); wandernde phlebitis (Neisser[15]). It is my opinion that the cause is bacterial, and continued efforts should be made, whenever the opportunity presents, to isolate the organism.

PATHOLOGY

Owing to the fact that few of these patients die, the literature has little of pathological importance. Schwarz[16] had two cases in which he performed biopsies. In his first case he excised a portion of the left cephalic vein and found it thickened. Microscopically, the intima was normal, the media thickened, and the adventitia thickened in one place. In his second case he went into considerable detail in describing venous structure. The intima, endothelium and valves were normal. The media was three or four times its normal thickness. The muscle bands were separated by edema and increased connective tissue. There was an irregular increase in vascularity (capillaries or finest arterioles?) Many spindle cell fibroblasts (spindelzellen) were present. There were localized infiltrations of varying density of polymorphonuclear leukocytes and small lymphocytes. Occasionally were found cells with round and curved nuclei and broad protoplasm, rarely a mast cell. The elastic cells of the media showed edema, splitting and knotting. In the adventitia there was edema. The infiltration was more marked than in the media, but the general plan was the same. There were many more mast cells evenly divided over the whole vein. The capillaries and smaller veins were sometimes filled with cells. In two places old canalized "pearls" were seen that resembled syphilitic endarteritis obliterans. The fat cells were atrophic with large nuclei.

Moorhead and Abrahamson,[11] in their *Case 4*, excised a vein which showed a firmly adherent clot with slight thickening of the vein wall.

Neisser[15] gave a rather elaborate description of the microscopic picture of sections from three excised veins. The veins were swollen in places, the swelling seemed to have been induced by collections of cells especially in the adventitia and media, though they were present also in the intima and in the perivascular tissue. In some of these collections, blood vessels were prominent; in others they were absent. Red blood cells were present in some, absent in others, and at times existed in the tissues independently. The cells in the collections were chiefly lymphocytes, occasionally neutrophils. In addition there were immature round cells, and finally larger protoplasm—rich cells with pale nuclei, round, polygonal, spindle shaped, that suggested fibroblasts. The endothelial cells were everywhere intact. Nowhere was there any sign of thrombosis.

In my own first case the autopsy added little to the pathological knowledge of this disease. The gangrene of the intestine offered a striking picture, but careful dissection of the arteries and veins and microscopic studies at different vascular areas showed some endothelial thickening of the artery but no thrombosis, while all the veins filled with non-attached clots showed but little inflammation. Evidently the point of primary attack, where there was inflammation and beginning thrombosis, eluded our search.

My second case, however, yielded some information of value. Although the clinical picture suggests strongly that the inflammation is confined to the veins, it would be of importance to find very early lesions and to see whether the inflammation actually involved the veins alone. The liver lent itself to this study. Sections were made through portions of the liver apparently uninvolved by the gross abscesses. Even here inflammation as evidenced by cellular exudate was fairly extensive in the periportal spaces and only after some search was an area found that seemed to represent the very beginning of the process (*Fig. 1*). In this portion of a periportal space may be seen sections of an artery, a vein and several bile ducts. About the vein is gathered a collection of cells that represent an inflammatory process. This collection leaves entirely uninvolved the near-by artery and the adjacent bile ducts. These cells are almost all lymphocytes. Only a very rare polymorphonuclear cell is present. On the basis of these findings, I believe the process is definitely a phlebitis.

Other portions of the sections of the liver show extension of the process until adjacent tissue is involved, and a series could be readily

pictured from this condition on to definite abscess formation. In addition, there was considerable degeneration in the center of many lobules, with swelling, paling and vacuolization of the hepatic cells. No infiltration of cells occurred in the centers of the lobules.

On the basis of the early inflammation about the veins in the liver, a similar condition can be surmised in the superficial veins as well as in the veins of other internal organs. Unfortunately through a misunderstanding, the freshly involved vein that was excised for me by Dr. Crisler was used entirely for cultural purposes instead of partly for the pathological study of the early lesion.

The series from the earliest pathological effect to the late ones can easily be reconstructed. Every phase is represented, but there is no satisfactory sequence in a single organ or patient. Inflammation develops in and about the vein wall, with some edema and infiltration with lymphocytes, at times neutrophils and more rarely red cells. This process may go only so far and then resolution may occur, with or without scar tissue formation. Or the process may involve the intima and endothelium and allow thrombi to form in the vessel. The clot may extend to considerable distances from the point of its attachment to the vessel wall without further adherence to the wall. When the acute process subsides, as it seems to in a few hours or days, the organization and canalization of the thrombus takes place.

There is nothing in any of these pathological pictures that is different from the usual phlebitis, with thrombus formation and organization.

According to Buerger,[17] there is a type of migrating phlebitis associated with thrombo-angiitis obliterans, especially in its early stages. The pathological picture in these veins does not seem to differ greatly from that in the syndrome designated thrombophlebitis migrans. In the present state of our knowledge no one can state whether or not there is any definite relationship between thrombophlebitis migrans and thrombo-angiitis obliterans. They may be the same disease with different forms of development, or they may be entirely separate entities. Arterial phenomena seem entirely out of the picture in thrombophlebitis migrans, but are the outstanding elements in Buerger's disease, even when migrating phlebitis co-exists with or precedes the arterial involvement. It is my belief that owing to its different life history, symptoms and prognosis, thrombophlebitis migrans should be accepted as an entity until further evidence shows this position to be untenable.

BACTERIOLOGY

As yet no organism has been definitely associated with this disease. Neisser stained sections of his excised material with Gram stain, but could demonstrate no bacteria. Schwarz found no bacteria visible with any method of staining. Blood cultures have been repeatedly found negative.[9 10 11 12 14 18 21 22] Culture was three times found negative in my second case, though on the eighth day one of these cultures, sterile on the sixth day, showed a growth of pneumococcus, obviously a contamination. Walker[23] once reported a culture of *B. alkaligenes* from the blood. Cultures of a fresh active lesion in my second case were sterile.

LABORATORY FINDINGS

The laboratory offers little help aside from the finding of a leukocytosis of a polynuclear type. Ellison reported a count of 18,000, Ryle[18] a count of 12,200 in one case and 27,000 in another associated with hemoptysis and pleurisy. In my first case, the white cell count was 7,800 with 78 per cent neutrophils during the earliest stages of a final mesenteric phlebitis. Later, when gangrene no doubt was setting in, the counts rose to 14,000 and 16,000. In my second case the counts varied: 8,100 with 63 per cent neutrophils; 13,000 with 76 per cent neutrophils; 11,000 with 78 per cent neutrophils; 10,650 with 84 per cent neutrophils.

On the other hand, Briggs reported the white count as not elevated, while Moorhead and Abrahamson reported in two cases that complete studies were negative. Krieg[21] reported quite low leukocyte counts in his cases.

Herrick found the "agglutinating and hemolytic properties" of the corpuscles and serum to be normal. The pleural effusion in one of Ryle's cases showed red cells, lymphocytes and polymorphonuclear leukocytes. Krieg[21] found a pleural effusion to be sterile, as well as peritoneal exudate. In Ryle's case the sputum was always red, but not rusty. In fact, whenever hemoptysis is reported the blood is red, never changed in color. In another case Ryle isolated the *Streptococcus viridans* from the sputum.

CLINICAL DESCRIPTION

Age.—In the more than forty cases which I have studied in the literature, including my own,

the ages have varied from 6 to 62 years. If this wide variation exists in a limited number of cases, there is no reason to believe that any age is immune to the disease.

Sex.—In the series studied, where the sex was stated, males seemed definitely to predominate: there were 27 males to 10 females.

Duration.—The individual portion of vein attacked may recover in two or three days, apparently without sequelae, or may recover from the acute stage of the inflammation in that time only to leave behind a clot as a thickened cord which may eventually be organized and recanalized and so remain indefinitely. The obstructive effect of the thrombus may last a few days or weeks or months. One cannot diagnose this disease, however, without a series of attacks, and the disease as a whole may incapacitate the patient for longer or shorter periods of time. There may be a series of attacks, then a period of freedom of quite variable duration, after which the attacks may start again. Thus one may expect the reported duration of the disease to vary greatly, and so it does, from 20 days or more to three years. Series of attacks may occur at intervals over periods of 5 to 10 years, or, as reported by Krieg, 24 years.

Organs Involved.—Although apparently any organ may be involved in this disease, I have seen the reports of only three cases where there was not involvement of one of the four limbs. Two of these were described by Paget as having pulmonary involvement; he did not definitely state but implied involvement elsewhere. His case reports were not complete, and the entity was not well recognized at that time. The third was the fifth reported case of Ryle in which he described a series of attacks in the lungs and "epigastrium." His previous experience enabled him to diagnose this case without the presence of other lesions.

The Extremities.—Any one of the limbs may be attacked alone or all four may be involved, leading to the phlebitis of the four limbs of the French. Of the cases I have reviewed in the literature only one[19] showed but one arm involved with other organs, and four had but one involved leg.[1 13 18 20] Practically all the rest showed both legs, and often both arms, affected. The legs are most commonly the seat of trouble and are most often the site of the primary manifestation of the disease. The thrombophlebitis follows no rule in attacking the veins; it skips and jumps about in the most haphazard manner from superficial to deep veins, from deep veins to superficial, with progress up or down the same vein, from one leg to the other, or to either arm and back again. And these attacks on the extremities are interlarded with attacks on the trunk or face or internal organs of greater or less severity.

The superficial vessels that are attacked show all the signs of inflammation, and often become hard and cord-like due to the thrombus formation. Owing to their rich anastomosis they seldom produce more than these symptoms unless it be a little local edema that soon passes off. When the deeper veins, and especially their proximal portions, are affected, the lesion is very apt to be followed by a high grade of edema which may long outlast the acute inflammation, which may indeed last until the slow process of organization and canalization of the thrombus allows a satisfactory venous drainage of the limb. This edema may vastly increase the size of the limb and cause it to be hard, and the skin to be tense and shiny. The joints are so stiffened as to make movement impossible; the leg may be so heavy that it cannot be lifted without outside help.

In addition, there may be considerable pain, even of great severity at times, without other observable changes, as in the right arm of my first case. The mechanism of production of this pain is not clear. There may be swelling between layers of fascia, involvement of a vein leading from a muscle, or increase of pressure inside the bone. Since other signs of neuritis were not present, it probably was not due to involvement of a nerve trunk.

The Lungs and Pleurae.—In about half of the cases under review there have been attacks involving the lungs and pleurae. These have varied from a severe dry pleurisy[11] and pleurisy with effusion[18 21] to attacks of pain in the thorax with hemoptysis;[11] from attacks suggesting diaphragmatic pleurisy with hemoptysis[18] to conditions suggesting mild pneumonia or infarction with rales, bronchial breathing, and dyspnea.[7 10] There may be nothing but slight pain with mild transient hemoptysis, or the pain and hemoptysis may recur several times in the course of a few weeks.[6] Several authors suggest that these attacks are embolic in nature, that portions of clots from thrombi in the extremities are carried to the lungs to produce infarctions. But the variety of the lesions in the lungs and pleurae themselves, the active migration of the process in the body at large; the involvement of veins in the limbs as well as in the veins (presumably) of organs where emboli of venous origin are unusual, all make it unlikely that the pulmonary

events are embolic in nature, but quite likely that they are of the same kind as the lesions elsewhere in the body, thrombophlebitic.

The Heart.—It is not uncommon for the process to attack the heart. This complication is reported in about 20 per cent of the cases. Although Coombs[20] spoke of an attack of "coronary occlusion" as part of this disease, it is uncertain from his report whether he meant occlusion of the coronary vein or artery. No pathological observations are available to prove this point, in his or other cases, but the rapid clearing of symptoms in the usual case as well as the development of the attack in the course of a series of venous phenomena seem to indicate that the attack is due to venous rather than arterial occlusion. The symptoms presented are tachycardia, with a rate as high as 140, some dyspnea, feeble pulse, at times with irregularity, once described as fibrillating, and anginal pain.[11] At times the attacks are mild; again they are so severe as barely to permit the patient to survive. Though no deaths have yet been reported from cardiac involvement, there is no reason to suppose that it cannot happen. Campbell and Morgan[19] report a case with a heart attack that yielded an electrocardiogram characteristic of coronary disease; it is not certain that this was due to thrombophlebitis, however. My first patient had an attack that was quite typical in its symptomatology of a fairly severe coronary occlusion. It was impossible to tell whether artery or vein was involved.

Comparing arteries and veins of equal size, occlusion of the vein would probably cause much milder symptoms than of the artery. In arterial occlusion, the area becomes promptly bloodless; in venous occlusion, the muscle still may be approached by blood under arterial pressure, and due to the pressure the blood would usually find an outlet through the many small anastomoses and thus maintain a circulation, however sluggish.

The Intestines and Appendix.—In a few cases unequivocal involvement of the mesenteric veins has occurred. In others it has been suspected from moderate attacks of abdominal pain without other intestinal symptoms. Hartfall and Armitage[10] report a case with severe epigastric colic, nausea, flatulence and distention, and frequent bowel movements of foul bloody mucus. Moorhead[10] described two cases with abdominal pain, one with melena, and one with collapse but without melena. Krieg[21] operated upon a case showing signs of peritonitis and found elongated masses on the mesentery in the region of the descending colon. Following intestinal anastomosis, pneumonia developed and the patient died. Autopsy was denied.

In my own first case the venous thrombosis was proved at autopsy, though the site of origin of the thrombus was not discovered.

Moorhead and Abrahamson[11] report a case in which an abdominal attack suggested a mild appendicitis. That this is possible is shown by Coombs' case[20] in which a gangrenous appendicitis developed as part of the series of thrombophlebitic events.

The only time the veins of the liver have been affected as far as I know is in my second case, except that Legrand[12] once spoke of the liver's being enlarged.

The Brain.—The cerebral veins are not immune to the ravages of this disease. Campbell and Morgan[19] reported a most unusual case of bilateral tubular vision; it is not certain that this was due to thrombophlebitis, however. It was followed by a "thrombosis of the subclavian vein," but that was the only definitely venous phenomenon. They even discussed the event as due to partial thrombosis of the posterior cerebral arteries. In Legrand's case generalized convulsions appeared, but this was during a period when oliguria of 200 c. c. in 24 hours existed for several days, and the convulsions were possibly uremic. In my first case, the patient experienced numbness of half of her body that lasted for a short period. This may have been an arterial event, secondary to hypertension. In Ryle's *Case 4*, the patient's face became "stiff" on the left side, and her hand became "woolly." In Gros' *Case 4* there were definite venous phenomena. On October 16, his patient complained of intense headache, nausea, vomiting, and had a convulsion. On October 18, he was somnolent and there was pain and swelling on the left side of the neck, although the external jugulars were normal. On October 23, he uttered a cry, had a crisis of excitement, went into coma with convulsions of a Jacksonian type, and his reflexes disappeared. He recovered, only to suffer in November a violent headache with vomiting with swollen prominent veins on the left side of the neck.

Kletz's[22] second case had headache and aphasia with weakness and incoordination of the right hand. She later was afflicted with cerebral thrombosis again that proved fatal.

Other Organs.—The skin of the whole body has been attacked by the disease. Not only the superficial veins of the limbs have been in-

volved, but of the abdominal wall, chest, back, buttocks and breast as well. Legrand[12] reports a patient with oliguria of 200 c. c. for several days, and Krieg[21] says one of his cases had anuria. This implicates the kidneys, but it is difficult to explain unless by bilateral attack, or unilateral attack with reflex suppression in the other kidney. Pelvic veins may be involved, too, because Krieg reports scrotal edema as well as Desplats[7]; Jaccoud[24] reports edema of the penis and scrotum. Evidently from the variety of organs attacked in this relatively small group of forty-odd cases, no vein in the body is immune.

Prognosis.—The disease varies from the mildest to the most severe states. No doubt many mild cases in which only one or two superficial veins were involved, or even a deep one, have been missed or if diagnosed have gone unreported. Other cases have been of moderate severity, causing incapacity for a few weeks; or because of involvement of large veins with production of edema, or because of repeated milder or more severe attacks, some cases have lasted months and years. At times the attacks have affected organs so severely as nearly to cause death, as in heart attacks, gangrenous appendicitis, and mesenteric thrombosis. In five cases death actually supervened out of the 43 here studied. Paget's case died of "embolism," Kletz's case of cerebral thrombosis, Krieg's of mesenteric thrombosis, with operation for intestinal anastomosis followed by pneumonia, and my two died, one of mesenteric venous thrombosis with intestinal gangrene, the other of hepatic venous thrombosis with abscess formation, associated with hepatic cancer.

Thus the prognosis, while favorable for life in most cases, often speaks for prolonged disability.

Treatment.—There is no known cure for the disease as such. Treatment must be supportive and symptomatic.

SUMMARY

Thrombophlebitis is apparently a clinical entity of unknown etiology. Seemingly infectious in origin, it yet has yielded no organism that can be considered its cause either in blood culture or culture of a freshly affected vein. Its pathological picture is not distinctive, there being merely an acute inflammation of the vein and surrounding tissue, often with thrombi of some length that eventually become organized and canalized. Clinically, it is characterized by phlebitis and often thrombosis that attack short or long stretches of veins, superficial or deep. The process may skip along one vein, up or down, or may jump to any other part of the body. The inflammation may subside in a day or two or may last longer, but the obstructive effects of the thrombosis, especially edema, may last weeks and months. It is probable that any organ may be affected, with any degree of severity, so that the patient may completely recover in a few weeks or die from the effects of the thrombotic lesions.

CONCLUSIONS

(1) Two fatal cases of thrombophlebitis migrans are reported with autopsies. One died of mesenteric venous thrombosis with intestinal gangrene, the other of thrombophlebitis of the veins of the periportal spaces of the liver with abscess formation. The second case also showed several moderate-sized areas of primary(?) liver carcinoma.

(2) A review of about forty cases of thrombophlebitis migrans in the literature is the basis for a clinical picture of the entity.

My thanks are due to Dr. J. A. Crisler, Jr., who performed the biopsy for me in my second case, to Drs. N. E. Leake, H. Jamieson and Prof. H. C. Schmeisser, who cooperated with me in the postmortem studies.

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DISCUSSION (*Abstract*)

Dr. Harry C. Schmeisser, Memphis, Tenn.—Thrombophlebitis migrans, Dr. Stern tells us, is an inflammation of unknown etiology limited to veins with a histology otherwise similar to that of thrombo-angiitis obliterans. It migrates from vein to vein, involving

any part of the general circulation, subsiding in one location while appearing in another. The thrombosing vein tends to produce a passive congestion of the tissues drained, which, however, may subside before any gangrene has set in. This is possible because of the rich anastomoses with other draining veins and the rapidly established collateral circulation and recanalization of the thrombus.

Dr. Stern considers thrombophlebitis migrans an entity to be separated from thrombo-angiitis obliterans. After hearing his paper and having had the opportunity of studying some of his pathological material, I must say that his conclusions are suggestive.

THE DIAGNOSIS OF BACTERIAL ALLERGY*

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By bacterial allergy is meant human sensitization to bacteria or to the products of their growth. Bacterial sensitization can be the cause of any of the allergic diseases, namely: asthma, perennial hay fever, urticaria, angioneurotic edema, eczema, or migraine headaches. Just as with sensitization to foods, animal epidermals, pollens and fungi, allergy to bacteria in the individual case may be suspected from the history, confirmed by means of skin tests, and treated by specific inoculations.

Although the idea of specific hypersensitiveness to bacteria as the cause of bronchial asthma has been vigorously opposed by many allergists in the past, we now see more and more students of the subject recognizing and accepting the specific role that bacteria may play in the causation of the allergic diseases. Cooke,[1] who has been one of the strenuous opponents of the bacterial hypothesis in asthma, has recently written a paper[2] in which he shows that asthma of infective origin is just as subject to hereditary influence as true atopic or skin-sensitive asthma; and furthermore, that eosinophilia, which may be regarded as an allergic phenomenon, is just as frequent in asthma of infective origin as in that of the atopic type. He concludes, therefore, that infective or bacterial asthma may be regarded as an allergic reaction quite as properly as is true atopic asthma. Cooke's findings with reference to eosinophilia in asthma are in perfect accord with my observations from a study of eosinophilia[3] reported in 1927, wherein I stated that the eosinophile average was almost exactly the same in bacterial as in atopic asthma and hay fever.

*Read in the Allergy Clinic and Round Table Session, Southern Medical Association, Twenty-Seventh Annual Meeting, Richmond, Virginia, November 14-17, 1933.

HISTORY TAKING

As invaluable information can frequently be obtained by careful questioning, an exhaustive history should be taken of every allergic individual, but I will refer only to such points as have a bearing on the diagnosis of bacterial allergy.

The age of onset is important. An allergic disease that starts after the age of forty years is almost always due to bacteria, as it is not likely that a person would then become sensitive to some food or air-borne substance that he had been exposed to all his life; and furthermore, bacterial infection, as of the respiratory tract, would be more likely to occur in the later years of life, due to the lowered resistance at that time. Walker[4] stated that none of his patients who began having asthma after the age of fifty were protein-sensitive. There are exceptions to this rule, however, as I have seen a few patients who, after the age of fifty, developed asthma that was due to sensitization to air-borne substances.

Bacterial allergy may be perennial or seasonal. The seasonal type of bacterial asthma is frequently limited to the winter months, but also commonly occurs during the changeable weather of early spring and late fall. One differential point between the spring and fall bacterial cases and pollen asthma is that the bacterial cases are more irregular in their time of starting and stopping than the pollen sensitive ones. Also the bacterial asthma and hay fever sufferer tends to be worse in damp, rainy weather.

The bacterial asthmatic usually has considerably more cough and expectoration than the pure atopic individual. In the bacterial type, as a general rule, coughing initiates the attack; whereas in the atopic type, shortness of breath and wheezing are the first symptoms noted, and cough does not usually occur until the attack is breaking up. It might be said that the bacterial asthmatic coughs himself into the attacks, whereas the atopic asthmatic coughs himself out. Between attacks, the bacterial asthmatic frequently has more or less cough and expectoration, whereas the atopic asthmatic is usually free of these symptoms. In bacterial asthma, the attacks most commonly begin in the early morn-

ing hours, whereas in atopic asthma, the attacks come on at any time, without warning, but dependent of course upon exposure to, or ingestion of, some offending substance. Atopic asthmatic attacks are usually more abrupt in their onset than the bacterial type. Bacterial asthmatics are usually more susceptible to sudden changes in the weather than are atopic asthmatics. Bacterial asthmatics are also more subject to "colds," sinus trouble, and bronchitis, than are the atopic asthma patients. Patients with bacterial asthma will commonly give the history that they never have asthma except when they take "cold." The atopic asthmatic also gives this history occasionally, when in reality his attacks are not due to taking "cold;" the symptoms simulating a "cold," such as sneezing, running of the nose and watering of the eyes are merely reactions of the mucous membranes to some offending substance. These atopic cases may usually be differentiated from the bacterial ones, however, by the fact that in the former the apparent "cold" and asthma may all develop within a few hours, whereas in the latter it usually requires several days for a head "cold" to get down in the bronchial tubes and produce asthma. When itching of the eyes is complained of in asthma or perennial hay fever, the case is not likely to be a bacterial one, as definite itching of the eyes is very suggestive of atopy, and in fact is almost always present when there is sensitization to some air-borne substance.

The nasal secretion in bacterial asthma and hay fever cases is likely to be thick, sticky and frequently yellowish, in contrast to the thin, clear, watery secretion of the atopic cases, although there may be a thin, watery secretion with a streptococcus infection. Likewise, the sputum in the bacterial case is more likely to be of a greenish-yellow, purulent nature than the grayish-white, jelly-like sputum of the atopic asthmatic. Bacterial asthmatics are much more likely to have fever with their attacks than are those whose asthma is due to sensitization to foods or inhalants. The atopic asthmatic usually runs a subnormal temperature, although children with uncomplicated pollen asthma may have fever.

EXAMINATION

In perennial hay fever, or asthma with nasal symptoms, examination of the nose will frequently differentiate the bacterial from the atopic type. A red, inflamed, congested nasal mucous membrane, nasal polypi, inflammation about the orifices of the paranasal sinuses, pus exuding from these orifices or lying free in the nasal cavity, all point toward bacteria as the cause, although, of course, bacterial infection may be superimposed on a true atopic rhinitis. In the uncomplicated atopic type, the nasal mucous membrane is pale, bluish-gray, and boggy or even water-logged in appearance—quite a different picture from the membrane of bacterial infection.

In the course of a general physical examination of patients in whom bacterial allergy is suspected, a diligent search must be made for all foci of infection, taking into consideration the teeth, tonsils, sinuses, cervix or prostate, and last, but by no means least, the colon. Transillumination and x-rays of the sinuses and teeth; bacteriological examination of cultures from all suspected areas, including careful study of the nasal secretion, sputum and stools; and leukocyte and differential counts, are all valuable aids in arriving at a diagnosis of bacterial infection and sensitization.

SKIN TESTS

Bacterial Proteins.—In my experience, cutaneous tests with stock polyvalent bacterial proteins very rarely give definitely positive immediate reactions, manifested by urticarial wheals with pseudopods, as described by Walker.[5] On the other hand, delayed reactions to stock bacterial proteins do occur, and although they are relatively infrequent, they are of considerable diagnostic importance, which justifies the almost routine testing with bacterial proteins. Where definitely positive reactions, immediate or delayed, are obtained to tests with bacterial proteins, excellent results are usually to be expected from proper treatment with stock polyvalent or autogenous vaccines of the corresponding organisms.

I use the following diagnostic bacterial proteins prepared according to the method of Walker[6] and Wodehouse: *Bacillus coli communis, B. diphtheroid, B. Friedlander, B. influenzae, B. pertussis,* and *B. typhosus; Micrococcus catarrhalis,* and *M. tetragenus; Pneumococcus type I, II* and *III; Staphylococcus pyogenes albus, S. aureus,* and *S. citreus; Streptococcus hemolyticus, S. nonhemolyticus,* and *S. viridans. Staphylococcus aureus,* and *Streptococcus hemolyticus* and *viridans* are the most frequent reactors among the bacterial proteins, and are also the three types of organisms that are most frequently encountered in cultures from allergic individuals. Occasionally a reaction is obtained

to some organism that cannot be isolated from the patient, but this does not detract from the value of the tests, as we must remember that the organism may be present in some remote part of the body such as the gallbladder, appendix, or intestinal tract; or the reaction may represent a sensitization produced by some previous infection that has ceased to exist, such as boils, a carbuncle, or diseased tonsils. As an example of residual sensitization, I might point out that the only reactions I have encountered to *Bacillus typhosus* protein were in individuals who had had typhoid fever earlier in life.

When testing with bacterial proteins, I almost always do a von Pirquet test at the same time, using undiluted old tuberculin (human type) and a glycerin-bouillon control. When a definitely positive reaction is obtained to a von Pirquet test, especially if it occurs immediately, careful search should be made for the presence of active tuberculosis, although the sensitization may indicate merely a past infection.

The technic of cutaneous testing is so generally known that I scarcely need describe it, but briefly it is as follows: both arms of the patient are bared to the shoulder and extended with the palms up, on a table adjusted to the proper height. The flexor surfaces of the upper arms and forearms are then thoroughly cleansed with 50 per cent alcohol. A series of minute linear incisions (not scratches) about one-eighth inch long are made down each arm, with the tip of a small, sharp scalpel. These incisions should be spaced at least one inch apart and should penetrate the outer layer of the skin, but not deeply enough to draw blood, other than the merest trace, which is often unavoidable. A small quantity of each of the dried bacterial proteins to be tested is applied to a separate incision and dissolved on the arm with a drop of tenth-normal (0.4 per cent) sodium hydroxide. To one of the incisions, only the sodium hydroxide solvent is applied, to serve as a control.

After about thirty minutes the tests are washed off with pledgets of sterile cotton moistened with sterile water, care being taken that material is not carried from one test site to another. The reactions are then interpreted in comparison with the controls and a written record is made of the results. An immediate positive reaction, which very rarely occurs with bacterial proteins, consists of a definite urticarial wheal about the site of the incision, surrounded by a zone of erythema. Doubtful reactions consist of an area of erythema without any wheal. After the immediate results of the tests are interpreted, the patient is requested to return the next day for further inspection, so that the presence of any delayed reactions may be detected. He is instructed not to irritate the test sites any more than is necessary in the meantime. These delayed reactions, which are the rule with bacteria, appear some hours after the tests are applied, manifesting themselves as red, inflamed, swollen, hot, tender, or even slightly painful areas about the test sites, with occasionally a small, sterile pustule over the site of the incision, having all the characteristics of a mild infection. These reactions are charted as doubtful (±), plus one (+), plus two (++), plus three (+++), or plus four (++++), according to their degree of severity in comparison with normal controls. Unless attention is paid to delayed reactions when testing with bacteria, almost all of the positive reactions will be missed. I will report briefly a case of bacterial sensitization.

C. N., a girl 13 years of age, was brought to me with chronic, perennial rhinitis. Skin tests revealed an immediate positive reaction to the protein of *Staphylococcus pyogenes citreus*, manifested by an irregular urticarial wheal one half inch in diameter, surrounded by a definite area of erythema. This reaction to a test with *Staphylococcus citreus* protein was elicited on several different occasions to remove the possibility of error. All other skin tests, including *Staphylococcus pyogenes aureus* and *albus*, were negative. Bacteriological examination of cultures from this patient's nasal secretion showed *Staphylococcus citreus* in pure culture, and treatment with an autogenous *S. citreus* vaccine relieved her entirely of the nasal trouble.

A single attempt at passive transfer of the *Staphylococcus citreus* sensitization to the skin of a normal individual, according to the technic of Prausnitz and Küstner,[7] was only doubtfully successful. Caulfeild,[8] however, has definitely demonstrated local passive transfer of bacterial sensitization, which proves the presence of circulating antibodies in some cases of bacterial allergy.

This case illustrates the high degree of specificity that may exist in bacterial allergy. I have never tested any other individual who gave an immediate urticarial reaction to *Staphylococcus citreus* protein, and I have never seen a patient with a dominant delayed reaction to the protein of this particular germ. Furthermore, this is the only bacteriological report I have ever received of *Staphylococcus citreus* in pure culture.

Autogenous Vaccines.—In any case where bacterial allergy is suspected, yet tests with stock

bacterial proteins fail to reveal the cause, cultures should be taken from all discoverable foci of infection. When indicated, cultures are obtained from the sputum, stools, nasal secretion, sinuses, throat, tonsils, teeth, skin, and cervix or prostate. Since the colon is frequently overlooked as a focus of infection, I should like to call particular attention to the importance of culturing the stools carefully for the presence of any abnormal micro-organisms, such as streptococci or staphylococci. Benson[9] also has emphasized the importance of stool cultures in asthma and other allergic conditions. The various organisms found in the foci of infection are isolated in pure culture and a separate vaccine, containing five billion organisms per c. c., is prepared from each. When the same type of organism is found in cultures from different foci, colonies from these different sources should be used in preparing the vaccine, in recognition of the possibility that they may be different strains of the same organism. The vaccine organisms are killed by heat, but instead of being suspended in physiological saline, they are suspended in an unheated Berkefeld filtrate, either of broth in which the same organism has been growing for about forty-eight hours, or of saline washings of the organism growing on agar. Whether to use broth or agar in preparing the bacterial filtrates is determined by the type of media on which the particular organism grows best. Vaccines prepared in this way, which will hereafter be referred to as vaccine-filtrates, have the added properties possessed by unheated bacterial filtrates, and should, theoretically at least, contain all of the proteins, carbohydrates, endotoxins, and soluble toxins, that are incorporated within the bacteria or liberated by their growth.

For a number of years, with the assistance of Dr. Oscar B. Hunter, an autogenous vaccine and a bacterial filtrate were prepared separately from each of the organisms isolated from cultures. On testing patients intradermally with these vaccines and filtrates, I noticed that the staphylococcus vaccines gave positive reactions more frequently than the streptococcus vaccines, and, just contrary to this, the streptococcus filtrates reacted more frequently than the staphylococcus filtrates. The probable explanation for this difference is that the staphylococcus depends largely upon an endotoxin for its effect, whereas the streptococcus liberates a soluble toxin. To simplify the procedure, from the laboratory as well as the clinical side, we finally decided to incorporate the filtrates with the vaccines as previously described.

The patient is tested intradermally with each of his vaccine-filtrates, sterile physiological saline containing a trace of agar, and sterile broth, being used as controls. A trace of agar is included in the vaccine control with the thought that the vaccines probably contain traces of agar from the culture media, and agar might be irritating to some skins, thus giving false reactions. For the same reason, sterile broth is used as a control on the filtrates. The controls also contain the same preservative that is used in the vaccine-filtrates, namely, 0.4 per cent tricresol. Sterile tuberculin syringes and very small needles (27 gauge, 3/8 inch) are used for making the tests. The needles should be sharp and rustless to avoid traumatizing the skin and also to make the tests as painless as possible. Most writers, in giving the technic of intradermal testing, advise injecting some measured quantity of fluid, namely, 0.02, 0.05 or 0.1 c. c. However, even though one starts with some definite amount, it is difficult to estimate how much actually enters the skin, as all syringes leak more or less after they have been used a while, and a considerable portion of the fluid may "backfire" alongside the piston. When fluid is injected intradermally, a blister is formed immediately, and equal quantities of fluid will produce approximately the same sized blisters. In testing vaccine-filtrates intradermally, I start with about 0.05 to 0.1 c. c., depending on the apparent tightness of the syringe, and inject enough to produce a blister approximately one-fourth inch in diameter. By this method an approximately equal quantity of each of the vaccine-filtrates and the controls is injected, and therefore the subsequent reactions can be fairly compared. In making intradermal tests with food, animal epidermal, pollen or other extracts, it is necessary to inject only enough fluid to produce a minute blister, say one-eighth inch in diameter; but in testing bacterial vaccine-filtrates, where the amount of allergic material is smaller, it seems desirable to inject the larger quantity.

Relatively little diagnostic information can be obtained from inspection of intradermal bacterial vaccine-filtrate tests after thirty minutes, as considerable traumatic inflammation is usually present, and furthermore, definite urticarial wheals with pseudopods rarely appear. However, if any of the tests have a larger wheal or show more inflammation than the controls, notation is made to that effect. The patient is then requested to return the next day for additional inspection of the tests and is cautioned against

irritating them in the meantime. Delayed reactions to intradermal vaccine tests differ only in degree from those obtained with bacterial proteins, being much more marked as a rule, and they are charted in the same way, namely, from doubtful (±) to plus four (++++). When the controls are also inflamed, the amount of this inflammation must be deducted from that of the vaccine-filtrate tests in order to estimate the true severity of the bacterial reactions. Unusually severe reactions may be accompanied by some lymphangitis, in the form of a red streak extending up the arm from the reaction site, with possibly some tenderness of the axillary glands. An occasional patient will also report an aggravation of his trouble, or a feeling of malaise, following the vaccine tests.

Those vaccine-filtrates which fail to show a reaction in twenty-four hours are disregarded, and those which react are used for treatment.

Stock Vaccines.—Where the existence of bacterial allergy is suspected, but tests with bacterial proteins fail to react significantly, and, for one reason or another, it is not possible to obtain autogenous vaccines for test purposes, then testing should be done with stock polyvalent bacterial vaccines. Also in some cases where autogenous vaccines are obtained and tested intradermally, the reactions are disappointing, and additional diagnostic information may frequently be obtained by testing with stock vaccines. I use the following stock polyvalent vaccines: *Streptococcus* (*viridans* and *hemolyticus*); *Staphylococcus* (*aureus, albus* and *citreus*); *Micrococcus catarrhalis; Bacillus mucosus capsulatus* (Friedlander), *B. coli communis* and *communior* (hemolytic and nonhemolytic), *B. influenzae, B. diphtheroid* and *B. pyocyaneus;* and *Pneumococcus.* To prepare these polyvalent vaccines, I mix small, equal amounts from each of the corresponding autogenous vaccines on hand. This gives a potent vaccine containing all the prevalent strains, and it is kept continually up to date by the addition of fresh varieties from newly prepared autogenous vaccines. Stock polyvalent vaccines are tested intradermally in the same way as autogenous vaccines and the reactions are also interpreted in like manner.

SUMMARY

Just as with sensitization to foods, animal epidermals, pollens and fungi, bacterial sensitization can be the cause of any of the allergic diseases, namely, asthma, perennial hay fever, urticaria, angioneurotic edema, eczema or migraine headaches. Bacterial allergy in the individual case may be suspected from the history and confirmed by means of skin tests with bacterial proteins, autogenous vaccines, or stock vaccines.

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DISCUSSION (*Abstract*)

Dr. David T. Smith, Durham, N. C.—In the Duke Hospital during the past three years we have had numerous cases which showed an immediate allergic wheal after skin tests with bacteria grown from their sputum. Some of these patients have been entirely relieved of their symptoms by treatment with bacterial vaccines.

Dr. Hal M. Davison, Atlanta, Ga.—In our office, testing with bacterial allergens has shown a few definitely positive reactions. These tests were repeated several times and the positive reactions always repeated themselves. The result of treatments with these allergens were questionable and we believe that cases of real bacterial allergy must be rare.

We must not forget, however, those cases of definite asthma recurring with such infectious conditions as pansinusitis, in which we cannot demonstrate any sensitivity. These and other cases undiagnosed by skin reactions may be caused indirectly by bacteria or by sensitization to bacteria.

We cannot be so enthusiastic as Dr. Brown concerning this matter. Let us benefit by his work and cooperate in learning the truth about bacterial allergy. We may consider it as yet unsettled.

Dr. Brown (closing).—If we all thought alike, there would be no purpose in holding a meeting of this sort. Our reason for coming here is to exchange ideas and experiences, and thus learn something new. Some have even gone so far in the discussion as to deny things I said nothing about. Dr. Piness, for instance, denies that removal of tonsils or other foci of infection will cure asthma. I did not say that it would, as my remarks were confined to the diagnosis of bacterial allergy. Were I discussing treatment, however, I would concur with him that operations seldom cure asthma.

It hardly seems fair to speak disparagingly of Dr. Cooke's paper on infective asthma. Certainly no one can accuse Dr. Cooke of having been a "germ enthusiast," and in the paper referred to, his conclusions were drawn from a careful and well-controlled study of a large series of cases.

Dr. Bernton spoke of having encountered large numbers of asthmatics in the Veterans' Bureau Clinic, who had already taken autogenous vaccines without results, the cultures for the preparation of the vaccines having been obtained bronchoscopically in a number of the cases. He concludes, therefore, that vaccine treatment is worthless. Nearly every hay fever patient who consults me has already tried some form of pollen injections with little or no results. This does not mean that pollen desensitization is not the ideal form of treatment for seasonal hay fever, but merely shows that the treatments have not been properly given.

Dr. Bernton claims that asthma may be due to sensitization to *Aspergillus fumigatus* and other molds, and I heartily agree with this. Then why not admit that asthma may be due to sensitization to other micro-organisms, such as the common staphylococci and streptococci?

This paper will have served its purpose if it makes you consider the possibility of sensitization to bacteria, along with foods, animal epidermals, pollens, and fungi, in studying any of the allergic diseases.

TRAUMA OF THE URETER*

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Trauma to the ureter is by no means uncommon. Accidental severing, or ligation, of the ureter, as well as incisions into the ureter during operations, occur more frequently than is generally known.

In 1932, Herman[1] reported a case of bilateral ureteral occlusion and 23 others collected from the literature. He quotes Sampson, who, in 1902, reported 32 unilateral injuries from the records of Johns Hopkins Hospital. Goldstein[2] reported an operative injury to the ureter during ureteral denervation in discussing Dr. Guitierez's paper at the recent American Urological Association meeting in Chicago. That it is a serious condition, which may lead to very disastrous complications, no one will deny.

The causes of trauma to the ureter may be:

(1) Accidents in which there has been a fall or injury to the body may damage the ureter, regardless of whether there has been an injury to the skin or not.

(2) Gunshot or stab wounds may sever or lacerate the ureter and it is not infrequently cut, torn or ligated during abdominal operations.

(3) Trauma from intra-ureteral manipulation. The ureter may be lacerated or pierced by a ureteral catheter or bougie, especially during dilatation of a stricture, or to promote the passage of calculi. This is more likely to occur when there is ulceration, beginning necrosis from the pressure of a calculus, or in diseased conditions, such as carcinoma or tuberculosis. The danger of tearing or puncturing the ureter is greatly increased when one uses metal instruments; therefore, they should be used only by the experienced cystoscopist, and even in his hands only with the utmost caution.

(4) Incision into the ureter for the removal of calculi. It may also be lacerated or torn completely across in separating it or freeing it from adhesions. It should be remembered that the blood supply of the ureter is in the periureteral sheath, and if this is removed, gangrene may result.

(5) Necrosis of the ureter has been known to result from prolonged pressure of the fetal head.

SYMPTOMS

These vary with the extent and location of the injury and the character of the urine. When the ureter is ruptured or lacerated, there is an escape of urine and hence tumefaction results in the loin and side if extraperitoneal, or in the abdomen if intraperitoneal. If the urine is infected and it escapes into the peritoneal cavity, peritonitis will result. In stab, gunshot or surgical injury (other than ligation) there is the escape of urine through the wound or a fistula develops later. Pain is usually severe, especially as the tumor increases in size. When the urine is infected, necrosis, gangrene and death may rapidly supervene. Hematuria may or may not be present. If present, it may be of such short duration as to escape observation.

DIAGNOSIS

With the advent of intravenous urography, the diagnosis is easy, provided the patient is not in shock. With the low blood pressure of profound shock, very little urine is executed, therefore an insufficient amount of iodide will escape and hence no shadow will appear on the x-ray film. In such cases, however, all means to combat shock should be instituted, and when the patient rallies either intravenous urography or retrograde catheterization and sodium iodide will demonstrate the injury. In some cases it will not be necessary to inject sodium iodide, as the

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lesion is noted when the catheter is seen to have escaped through the torn ureter on the x-ray film.

PROGNOSIS

The prognosis is good in extraperitoneal injuries if an early diagnosis is made and prompt measures are instituted, though, of course, the extent of the injury and the condition of the patient are the factors which determine the prognosis. In non-infected cases, intraperitoneal rupture is serious; but if it is diagnosed early and the peritoneal cavity is drained and a repair of the ureter, or a nephrectomy is done, the patient usually recovers. In infected cases, however, peritonitis may have already set in. Hence the gravity is greatly increased.

In surgical injuries, the prognosis depends upon the extent of injury and the condition of the patient. If both ureters are ligated, and uremia has supervened, the prognosis is grave. If the ligatures have damaged the ureters to such extent as to require transplantation into the bladder, the gravity is increased. If, however, the ureter is lacerated or cut across, it usually manifests itself in a urinary fistula through the wound or the vagina. It has been the experience of the author that injuries to the ureter, unless splinted by an indwelling ureteral catheter, result in cicatricial contraction of the lumen with resultant back pressure and destruction of the kidney. This is always true of cases of complete severance of the ureter.

TREATMENT

This depends upon the site, nature and extent of the injury as well as the condition of the patient. In uninfected cases, where the ureter is not severed, splinting with an indwelling ureteral catheter, which holds the lacerated edges more or less in apposition, and prevents leakage of urine, will often succeed in closing the wound. If it fails, then operative closure should be done. If it is not feasible, transplantation of the ureter into the bladder or nephrectomy is indicated, provided the other kidney is in good functional condition. It should be borne in mind, in operating upon such cases, that cicatricial contraction is likely to occur at the sight of repair of the ureter, especially when an anastomosis has been done. Sacrifice of a good kidney is preferable to subjecting the patient to a life of monthly or bi-monthly ureteral dilatations or a secondary nephrectomy.

The cases I herewith report are three in number, two being due to surgical injury (one during a herniotomy and the other following ureterotomy and the unsuccessful attempt to remove a stone from the lower ureter) and one in which the ureter was torn from its attachment to the kidney pelvis from injury sustained in an automobile accident.

CASE REPORTS

Case 1.—Mrs. T. O. V., white, married, aged 30, consulted me September 16, 1933. She had had herniotomy (left inguinal) June 28, 1923, and on July 3, 1933, urine began draining from the lower angle of the wound. This was accompanied by a dull, heavy pain in the loin and back, which had continued ever since. She weighed 250 pounds at the time her operation was performed and now weighed 140 pounds. On cystoscopy, obstruction was met about 5 cm. up the left ureter; the catheter would pass no farther. There was free flow of clear urine from the right ureter, no flow from the left. Phenolsulphonphthalein output was 27 per cent from the right, none from the left in 15 minutes. The right pyelogram was normal. At operation the left kidney was found markedly hydronephrotic. A left nephrectomy was done and she made a prompt recovery.

Case 2.—L. R., a white man, married, aged 35, consulted me October 25, 1925. He was unsuccessfully operated upon for a calculus of the lower right ureter on August 25, 1925. The ureter was incised in several places, but the surgeon was unable to remove the stone. Ever since his operation he has had a fistula in the lower angle of his wound, which has constantly discharged urine and pus. His general health has been good. On cystoscopy, an obstruction was encountered about 4 cm. up the right ureter and the catheter would pass no farther. X-ray showd a calculus about 2 cm. wide and 3 cm. long in the lower right ureter at the tip of the catheter. There was free flow of clear urine from the right, no flow from the left; no 'phthalein from the right; from the left, 29 per cent in 15 minutes. The left pyelogram was normal. Operation consisted of right nephrectomy and curetting of the urinary fistula. No attempt was made to remove the stone. The patient made a satisfactory recovery. The fistula continued to discharge pus for about two months, then healed, and has continued closed ever since, despite the fact that the stone was not removed.

Case 3.—C. B. R., a white man, married, aged 30 years, consulted me October 28, 1932. Seven weeks before I saw him he was in an automobile accident. The automobile turned over and he was pinned down under it, with the car resting on his right side, near the free border of the ribs. A diagnosis of a broken rib was made. He suffered severe pain and the entire loin and right side of the abdomen became swollen, tense and painful. After two weeks, a bulging mass developed just below the free border of the ribs. He had no fever at this time, but suffered from a sense of pain, weight and fullness in his side and abdomen. His condition continued about the same, but the swelling became more apparent. After two weeks more his physician aspirated his loin and drew off 32 ounces of clear, watery fluid. This was repeated three times. The last time, two days before I saw him, the fluid was cloudy and contained flakes of pus. He had had chills and fever the two preceding days. He then consulted me.

At my examination, a diagnosis of ruptured ureter was made. As he was uncomfortable from the pressure of the escaped urine, aspiration was done, and 30 ounces of cloudy urine with flakes of pus were evacuated. He was then cystoscoped. A No. 6 catheter passed easily to the left pelvis and apparently passed to the right pelvis. A moderate flow of clear urine was obtained from the left, but only an occasional drop of cloudy fluid from the right. Phenolsulphonphthalein appeared in 2½ minutes from the left, 26 per cent in 15 minutes. None was obtained from the right. X-ray and injection of sodium iodide showed the right ureter severed from the kidney and the pyelographic media was diffused in the periureteral tissues. He was operated upon the next day. When the transversalis fascia was incised, a large amount of purulent fluid was evacuated. The right ureter was found completely severed near the uretero-pelvic junction; the right kidney was markedly hydronephrotic and surrounded by extensive adhesions. A subcapsular nephrectomy was done and he made a slow, but satisfactory, recovery.

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PRACTICE IN PERORAL ENDOSCOPY*

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Because of the increasing importance of peroral endoscopy in the air and upper food passages, and the need for further training and experience in this branch, I have sought a means of improving my knowledge and technic, without too much loss of time, and without too much expense. Cadavers were not available, and my attention was focused on the dog. Thinking that the experiences gained may be of interest, I have written this resume of my work with dogs.

Two stray mongrel dogs were caught for me by boys. More were provided from time to time as needed. An enclosed back yard served to confine them. The basement was utilized as a workroom. The most commonly used endoscopic instruments were obtained. A simple "trough" operating table for dogs was constructed from rough lumber. (These can be obtained from the surgical supply houses already built.) An 18-year-old negro boy acted as general helper and assistant. The work was done at night in order not to interfere with my office work.

In the first two experiments (not included in this series) ether was used as an anesthetic. It was unsatisfactory in that it was too time-consuming, and too many assistants were required. At this time sodium iso-amylethyl barbiturate (amytal) was in the experimental stage and I decided to try it. A quantity was obtained through the courtesy of the manufacturers and it was used intravenously in all cases with uniformly good results. The recommended dosage of 50 mg. per kilo body weight was used. This figured about 0.363 grains per pound. A dog weighing 10 pounds required a dosage of 3.6 grains.

In the series here reported, thirty different experiments were performed, each one averaging one laryngoscopy, two bronchoscopies, and one esophagoscopy, making a total of thirty laryngoscopies, sixty bronchoscopies, and thirty esophagoscopies. In reality many more were done, as bronchoscopy was repeated sometimes three or four times on a patient at one sitting. One dog, No. 4, was anesthetized nine times. Finally he was given to an old negro man, who still had him six months later. There was one fatality and it could not be traced directly to the anesthetic. This dog was brought in by the owner, who suspected a foreign body in the throat. It was a very sick animal when first seen. The usual dose of amytal was used and he lived for twenty hours after the injection, never regaining consciousness. No foreign body was found.

The effect of sodium amytal on the respiration and pulse was almost always the same, namely: an immediate slowing of the respiratory rate and a rapid increase of the pulse rate together with a lessening of the volume of the pulse.

There were no alarming symptoms in any cases during the instrumentation, which encouraged confidence and calm on the part of the operator. At the end of an hour the pulse did not regain its normal volume, but was much improved. As a rule there was immediate quiet sleep, even before completion of the injection, though in a few cases there was initial moderate excitement with struggling, which soon ceased. After completion of the injection the anesthesia was nearly perfect, with no need for hurry, and with a dry field in the larynx and bronchi. These factors make it an ideal anesthetic for the beginner.

We thus had the patient and the anesthetic,

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but no actual foreign body. In the beginning an object, such as a grain of corn, was carried with forceps through the bronchoscope into the bronchus, turned loose, again grasped, and withdrawn. As experience increased, tacks, pins, and so on, were used. They were left in the bronchus while the instruments were withdrawn, the dog's position changed so as to move the object, the instruments reintroduced, the object located, caught and withdrawn. Many problems presented themselves in the removal of these foreign bodies. They were met successfully except in one instance. In this case (experiment No. 25) a small round headed tack was left in the left bronchus at its division. Each attempt to catch it with forceps pushed it down farther, the head being proximal. It finally became lodged in the upper lobe bronchus, fitting it tightly, with the rounded head just visible. Efforts to catch it were in vain and after two hours of work it was given up. It was thought the dog would surely develop pneumonia and die. However, the next day he was playing around and seemed well except for a cough. This cleared up completely after about three days. A week later another bronchoscopy showed no foreign body. He had evidently coughed it up.

The following was the procedure used as nearly as possible in each case. The dog was laid on the table, the legs extended, and tied down with a 2-inch bandage. Gentleness was used, and every effort made to treat the dog as if he were a real patient. The hair was clipped with scissors over the anterior surface of the neck, then shaved for about two inches over one of the external jugulars just above the clavicle. The skin was scrubbed with alcohol and the sodium amytal was dissolved in sterile distilled water and prepared for injection with a sterile syringe. The assistant held the head in extension and exerted slight pressure over the external jugular, making it stand out while the needle was inserted into the vein. The solution was injected very slowly, the amount having been previously determined according to the dog's weight. The patient was usually fast asleep by the time 2 or 3 c. c. had been injected. A large cork was inserted between the molars, then the mouth was bandaged, to keep the jaws firmly clasped on the cork. Bandages were then removed from the legs, as there was no further need for restraining the dog.

Instrumentation was then begun. The laryngoscope connected to the battery was slipped over the base of the tongue; the epiglottis was exposed and lifted. The bronchoscope was carried through the laryngoscope, which was then removed. The bronchi were explored at our leisure, after which some foreign body was carried in with forceps and left at a point in the bronchial tree. The bronchoscope was withdrawn and a smaller one then introduced in its full length, another foreign body carried in, released, caught again, and withdrawn. The original bronchoscope was reintroduced and the first foreign body located, caught and removed. The esophagoscope was then introduced, slowly carried its full length through the esophagus and into the stomach, then withdrawn. Respiration and pulse were taken in the beginning, after ten minutes, and again after about forty-five minutes and recorded. The animal was then wrapped in a blanket for the night. The above manipulations required from 45 minutes to 1½ hours, and as a rule were done between 8:00 and 10:00 p. m. When seen at about 8:00 the following morning, the dog was usually groggy, but able to get up and run around unsteadily. At noon he was released and fed. By the following day he was usually as playful as ever.

REMOVAL OF FOREIGN BODIES FROM BRONCHI, LARYNX, AND ESOPHAGUS OF DOGS

No. Experiment	Wt. of Dog in Lbs.	Dosage of Drug in Grains	Respiration and Pulse			Laryngoscopy	Bronchoscopy	Esophagoscopy
			Before Anesthetic	10 Min. After	45 Min. After			
1	37.5	13	8/120	—	—	1	0	1
2	34	15	10/120	8/150	—	2	2	1
3	37.5	15	81/120	5/134	6/134	2	2	1
4	26	12	—	5/134	6/120	3	3	1
5	34	11.5	—	10/135	—	2	2	1
6	18.5	7	10/88	8/140	11/126	2	2	1
7	26	12	—	10/150	—	3	3	1
8	37.5	12	—	8/150	—	1	2	1
9	34	12	—	10/120	—	1	1	1
10	18.5	6	12/80	12/130	11/150	2	4	1
11	26	9	12/110	8/140	10/116	1	2	1
12	37.5	12	13/106	8/128	9/120	1	3	1
13	18.5	6	—	16/120	—	1	1	0
14	26	9	16/120	6/140	—	1	3	1
15	18.5	7	18/108	27/150	—	1	3	1
16	26	9	16/123	7/120	11/120	1	3	1
17	18.5	6.5	18/124	19/140	22/140	1	3	1
18	26	11	?/110	—	21/132	1	3	1
19	18.5	6.5	22/132	30/140	—	1	3	1
20	26	11	28/104	5/144	7/108	1	3	1
21	18.5	6.5	40/96	20/160	16/128	1	3	1
22	14	4.75	25/110	33/152	—	1	2	1
23	31.5	10.5	10/84	12/132	7/112	1	3	1
24	31.5	10.5	20/84	10/164	10/128	1	2	1
25	18.5	6.75	55/116	20/150	18/150	1	2	0
26	31.5	10	10/80	5/112	8/100	1	3	1
27	18.5	7.5	—	11/144	16/144	0	3	1
28	20	6.75	20/106	12/160	12/140	0	3	1
29	39	14	—	—	—	1	1	1
30	12	3.25	—	—	—	1	1	1

A table is appended which summarizes thirty different experiments, in which endoscopies were performed on the dog. In all but three dogs, one or several foreign bodies were introduced. The foreign bodies used were: gem clips, pieces of match stem or toothpick, orange seeds, popcorn grains, peanut particles, tacks, staples, pencil leads, and so on.

CONCLUSIONS

(1) Practice and experience in peroral endoscopy may be obtained at home, with little loss of time, and without great expense.

(2) For the man already trained in the work, but who does it only occasionally, opportunity is afforded to keep the fingers and eyes in trim and to keep the necessary "touch and feel" of the instruments.

(3) Sodium iso-amylethyl barbiturate intravenously makes an ideal anesthetic for this work on dogs.

DISCUSSION (*Abstract*)

Dr. V. K. Hart, Charlotte, N. C.—This paper can be best discussed under several headings:

(1) Endoscopy is achieving an increasing field of usefulness in everyday medicine. In testimony whereof, we see increasingly in the literature accounts of the successful treatment of lung suppurations; the value of endoscopic aid in exact diagnosis, and in particular endoscopic biopsy; the usefulness of pneumonography; the removal of benign growths by endoscopy; the direct application of the cautery and radium; the direct treatment of strictures; and of course that field which first gave endoscopy its prominence through the pioneer work of Chevalier Jackson, namely, the removal of foreign bodies.

(2) As a corollary of the above, we should, therefore, perfect ourselves in the use of these instruments and in our knowledge of normal structures and relationships. In this effort, the essayist is to be commended. The interest of our patients is best accomplished through perfecting ourselves. The cadaver and the dog are excellent aids in cultivation of the fundamental knowledge that is a prerequisite to perfection. I would add one that was long ago emphasized and perfected by Jackson: the use of the practice board. This is particularly important in working out certain problems of foreign body extraction.

(3) One pitfall of work on dogs shou'd be avoided. They will tolerate prolonged working periods. Not so, small children. What is done for children must be done quickly as well as facilely. Often these children are very ill. Unnecessary shock must be avoided. Prolonged working time always adds to the probability of a postbronchoscopic edema. We limit our working time in small children to ten minutes. We find it much better to do a second endoscopy if necessary. This is the most difficult lesson for a beginner to assimilate.

(4) This brings me to my last consideration of the essayist's paper: the importance of trained operating room nurses and, if possible, trained endoscopists as assistants. If such colleagues are not available, it is relatively a simple matter to teach physicians and nurses the fundamentals involved. More than once in our own clinic I have seen this factor of teamwork tantamount to the saving of a life, particularly with a large foreign body at the bifurcation. It must be remembered, too, that in small children we work without anesthesia. Hence the added importance of perfect teamwork.

The essayist deserves credit for taking the time and trouble to acquire and maintain skill in the manner described.

Dr. Murdock Equen, Atlanta, Ga.—It has been observed that dogs have an expulsive power in dealing with foreign bodies in the tracheobronchial tree which is largely lacking in the human. If a dog is allowed to get up on his feet he is able to cough up objects in the terminal bronchi which would be quite impossible for a human being. If persons had the same expulsive power, the bronchoscopic removal of foreign bodies would rarely be necessary.

Many medical schools today are offering courses in surgery of the dog to give the student actual operative experience. Such work as Dr. Gaines has done should be excellent training for physicians who are planning to practice this very highly specialized form of surgery. The struggles of the animal, the color of the mucous membranes, the moisture, the factor of respiration and mechanical problems of removing the foreign body make the operative procedure and findings closely resemble those seen in the human being.

Dr. Gaines (closing).—Please bear in mind that the dosage of intravenous anesthetic here recommended is for use in animal experimentation only.

A small dog, one weighing from 8 to 12 pounds, is most desirable, as its trachea and bronchi more nearly approximate those of a child in size.

HEALTH CENTERS IN RURAL PUBLIC HEALTH SERVICE*

By T. Paul Haney, Jr., M.D., C.P.H.,
McComb, Mississippi

Perhaps you have heard the old story about what the mosquito said when he bit the Prince of Wales. "At last," said the mosquito, "I have royal blood in my system."

For years we have been searching for the best method of selling the people of both urban and rural sections the conviction of the necessity and effectiveness of public health work. With the proper use of rural and urban health centers, we may have a "royal" avenue to this coveted goal. And with this method which I propose to discuss, we may have not only an effective means of selling the value of public health, par-

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ticularly to rural people, but an effective means of administering it as well.

Our friend, Dr. Ira V. Hiscock, of New Haven, Connecticut, has submitted a very splendid definition of what we mean by the term "health center." He terms it

"a community agency engaged primarily in preventive medicine and public health education, centering around an organization of physicians, nurses, other trained health workers, and laymen. It aims to reach all people within a district who need the services" (they all need it) "and to coordinate the health and often the recreational and social service activities of the area."

The health center movement is still relatively new. In the United States it has come into prominence within the last twenty years and it came from the dispensary. In England it began earlier, but applied only to infant welfare stations. Dr. W. C. White, in Pittsburg, Pennsylvania, probably pioneered the movement that has evolved the modern health center as now established in many of our larger cities in the United States. The Blossom Street Health Unit, which opened in Boston in 1916, was among the first large centers established. The Bellevue-Yorkville Health Demonstration in New York City is an example of a recent development of a high type health center. Various other cities, including Milwaukee, Chicago, St. Louis and Los Angeles, have adopted the plan.

Dr. J. H. Pomeroy, formerly Health Officer of Los Angeles, says that the movement was developed there with the idea of having a health service station which would increase until all services were available in all communities. Several centers valued at $125,000.00 to $250,000.00 each have been established within Los Angeles County. This is the only place in which, in the literature of the past twenty years, I find the movement extended to county service. I understand that in this instance Los Angeles County is practically an urban area.

The functions and the factors responsible for the establishment of health centers are essentially the same in all areas in which the plan has been adopted. The functions are the same as those of any effectively administered full-time health department whose service is extended both to urban and to rural areas. This paper will not permit discussion of such functions; however, a general outline may be given. It concerns itself with:

(1) Services to well people regardless of financial status.

(2) Collection, study and analysis of vital statistics.

(3) Activities for the control of communicable disease.

(4) Measures for the control of tuberculosis.

(5) Measures for the control of venereal disease.

(6) Maternity hygiene.

(7) Infant, preschool and school hygiene, to include child welfare work, child guidance or neuropsychiatric service, nutrition and sunshine schools, and so on.

(8) Diagnostic laboratory service.

(9) Sanitation.

(10) Health education, to include consultation service to physicians and advice and general information to the public relative to public health and social welfare.

There are two factors common to all health centers and directly concerned with their establishment, namely:

(1) A definite district or population unit, with all persons therein receiving alike the services offered.

(2) Coordination of services within the area, embracing facilities of the health department and those of all other agencies.

From these factors a complete definition, and one very similar to that of Dr. Hiscock, may be obtained, namely: the health center is an organization which promotes and coordinates needed medical service and related social service for a specified district. Such an organization is more ideally possible and practical if it embraces all public and individual health, welfare and relief agencies and is housed under one roof. This should not mean that all agencies should be under the same administration.

Dr. Allen W. Freeman, in his treatise, "A Study of Rural Public Health Service," says:

"Rural health service of the United States is in process of evolution from the form in use in the last quarter of the Nineteenth Century into a form corresponding, in its general outlines, to the health department of a city. There seems no doubt that it is in the direction of county organization that further progress is to be expected."

The city health department method of health administration was studied for use in rural areas because it had proved successful in the city. It was a step toward decentralization for the purpose of carrying health service to the individual. The full-time county health department is administered on a much smaller scale than that of a large city health department. This is a step further toward decentralization. Large city health departments have found the health center a step further toward decentralizing health service and have thus been able to supply, practically, modern preventive medicine to a larger proportion of the population. Effectively administered county health departments can, and will, experience the same results. Health centers in rural areas should be con-

ducted on a much smaller scale than those in urban areas.

The writer, in 1929, organized a health center at Durant in Holmes County, Mississippi. This center has continued functioning to the present time. The first rural health center in Pike County was organized at Magnolia in April, 1932. This was in response to the need for a method of securing a more practical application of scientific knowledge concerning health and disease to individual cases in the community. At the present time there are seven such centers in different communities in the county. Description of the Magnolia Health Center will be used in this paper to illustrate this work as it is now being carried on in Pike County.

The Mayor and Aldermen of Magnolia were asked to furnish suitable quarters for the center. A ground floor suite of three rooms situated in one of the business houses was obtained. Incidentally, the center is adjoining on each side the offices of two practicing physicians. A lavatory, heat and electricity were installed. An interested druggist near by donated much of the furniture. The wife of a deceased physician donated an examining table. Shelves for literature and posters were built. A sign was painted designating the office hours. Within two weeks' time the center was in readiness for health work to begin. On the opening day ninety persons visited the center for service.

When it was known that provision had been made for quarters for a health center, the local district nurse of the health department arranged a meeting for the health officer to talk to a group of the leading club women of the municipality. Eighteen women attended this conference, representing practically every club and society in the community. The health officer discussed "How Lay People Can Be of Service in the Program of a Full-time County Health Department." After the discussion, a community health council was organized. The purpose of this council is to make available to the county health workers the cooperation and service of all the people of the community. Council members were immediately assigned duties. Such councils consist of from five to twelve members; meetings are held at certain intervals, usually quarterly.

The work carried on in the health center has been conducted in close cooperation with the local health council. Although this is a voluntary group, it is active and has shown a very keen and sincere desire to cooperate in every way possible. This group was responsible for the passage of the United States Public Health Service standard milk ordinance by the Magnolia Mayor and Board of Aldermen. Each member meets mothers in the district and is thereby responsible for a large per cent of the center visits. This group furnishes complete layettes for the center loan closet. It installed milk booths in the schools and saw that milk was furnished the indigent, under-nourished children. It is active in carrying on the community health education program. The council has, in a large measure, been responsible for the development of a public sentiment endorsing the local activities of the health department.

In Magnolia, as in all other communities in Mississippi, the negro midwife is a most valuable assistant to the health worker. Midwives have repeatedly brought to the center for examinations the complete list of pregnant women whom they expect to deliver. In so doing they have also brought along the infants and preschool children in their community. Midwives deliver 95 per cent of the negro children born in Pike County.

This paper will not permit detailed discussion of the activities carried on in the Magnolia Center. Practically every type of service rendered in the central office in McComb is also rendered in this center. The sanitary inspector sends his food handlers in for physical examination. He also uses the center in the same capacity as he uses the central office. The veterinarian meets his dairymen there. He also discusses with parents the use of safe milk for their children.

An interesting feature in the development of the rural health centers, and also the whole public health program now carried on in Pike County, is the sincere interest shown by local physicians in grasping the work. The Pike County Medical Society has wholeheartedly promoted the program outlined and advised by the health department. Pike County physicians have participated in every type of medical conference sponsored by the health department. During 1933, they have done 90 per cent of the work done by a physician in all the health centers, medical conferences and medical examinations of school children. The type of work rendered in each instance has been most satisfactory. Opportunity is herein taken to digress long enough to express sincere appreciation and thanks to each of the Pike County physicians for this splendid service.

There are four district nurses and one supervising nurse serving a population of thirty-three thousand in Pike County. McComb, with a

population of 10,056, is the only city of over 1,700 people (1930 census). The county is divided into four nursing districts, each with, as nearly as possible, an equal population. The nursing district is further divided into five nursing communities. Thus the one nurse serving in the Magnolia Center has similar duties in four other communities. She, therefore, can allow but one day for work in the Magnolia Center. Incidentally, she has three other rural health centers in her district. The supervising nurse actively participates in all the nursing activities in each of the four districts.

Six of the ten activities used in the survey schedule of the appraisal form for rural public health work will be used to illustrate in part the work carried on in the Magnolia Center. The figures given represent the activities during a twelve month period, beginning October 1, 1932.

(A) ACUTE COMMUNICABLE DISEASE	
Complete typhoid immunizations	230
District quota	225
Complete diphtheria immunizations of children under five years	68
District quota	111
(B) VENEREAL DISEASES	
Syphilis cases registered with private physicians and adequately treated	17
District quota	35
Gonorrhea cases registered with private physicians and adequately treated	6
District quota	8
(C) TUBERCULOSIS	
New cases visited by nurse	8
District quota	9
Number known living cases	16
District quota	22
Visitors to center for diagnosis	46
District quota	68
(D) MATERNAL HYGIENE	
No. pregnant women under supervision of center	60
District quota	56
No. visits to center by prenatal pregnant women (In lieu of field visits)	207
District quota	235
Urine specimens collected by nurses	64
District quota	50
(E) INFANT HYGIENE	
No. of visits of infants to center	137
District quota	273
(F) PRESCHOOL HYGIENE	
No. visits of preschool children to center	154
District quota	139

Analyzing this data, it is seen that there is favorable comparison of this work with the standard for the district as set up by the American Public Health Association in the appraisal form for rural health work.

The Magnolia Center embodies only about one-third of the population of the nursing district. The following activities approximately equal the quota for all of the local nursing district: typhoid immunizations, new tuberculosis cases visited by the nurse, visits by pregnant women to the center in lieu of field, number of prenatal cases under supervision of the center, urine specimens collected by the nurse and the number of visits of preschool children to the center.

The following activities will equal 50 per cent of the quota for the whole district: diphtheria immunization of infants and preschool children, syphilis and gonorrhea cases registered for treatment, number of known living cases of tuberculosis, visits of tuberculosis cases to the center for diagnosis, and number of visits of infants to the center.

The program now carried on in several of the rural health centers in Pike County has reached such proportions that it is felt expansion of facilities will be necessary in the not distant future. The Century Club in Magnolia, cooperating with the health council, is now interested in securing larger and better quarters for the center.

It is believed that eventually there will be provided a whole building consisting of a reception room each for white and black, several private examining rooms, sufficient auditorium space, office and record rooms and sufficient loan closet space. There should be laboratory and x-ray facilities (portable x-ray equipment is suggested); there should be a library adequately furnished to meet the health library needs of the community; there should be all other equipment necessary to carry on modern public health service for the community. There should be ample ground space about the building for playground supervisory instruction and car parking. The building should be as near as possible to the community center of population. In Pike County, I should like to see from 10 to 12 such rural health centers.*

The functions of, or services rendered in, the rural community health center should be the same as has been discussed previously in this

*During the first four months of 1934 and since this paper was read, three modern health center buildings have been erected in Pike County. All buildings are made of brick and conform to the description outlined in this paper relative to floor plans and equipment. (Copy of plans may be obtained upon request.) The City of Magnolia has invested in their health center over $8,000. The City of Summit has an investment of over $6,000 and the Holmesville Health Center, located twelve miles from McComb and in a strictly rural community, represents an investment of over $5,000.

An organized community health program, as outlined in this paper and under the direction of the Pike County Health Department, is carried on in each of the three health centers. The people served by these centers thoroughly appreciate the health center plan. This is demonstrated by their enthusiastic use of the buildings in carrying on their health program and other community activities.

paper and as carried on in any city health center in so far as can and does apply to rural public health work. All community welfare organizations should have free use of the center for any of their work at all times. Every phase of community activity that has to do with the health, pleasure and well-being of the individuals constituting the community should be centralized in the community health center.

The following are some of the advantages to be derived from the use of health centers in rural public health work:

(1) It stimulates sincere community interest in the public health and welfare by providing definite duties for lay helpers, thus instilling in the mind of every individual in the community that the state and county health and welfare program is a real part of the community life. Thus the individuals appreciate that the type of service rendered and results obtained are directly in proportion to the time, effort and money their community places in the health center and its activities.

(2) It enables health workers and other community welfare workers to cooperate in obtaining their one and the same goal, namely: making lives in the community longer and more worth the living.

(3) It conserves the time of the health and other community welfare workers and also the time of all the recipients of the services rendered, thus making the services most economical.

(4) It enables the worker to render a greater volume of service and, at the same time, to render a more efficient service.

(5) There has been a large volume of literature published concerning the general practitioner's relationship to the public health programs carried on in the United States and in other countries; public health and organized medicine; the health officer and organized medicine; the hospital and public health work; the physician's opportunity in public health work; problems and opportunities in public health and the relation of the physician thereto; organized medicine's attitude toward public health; and so on. I believe the rural community health center will give the greatest opportunity to the health worker, to the medical profession, and to the public to coordinate their combined efforts in the most efficient, economic and pleasing manner to the end that the optimum health, welfare and happiness of the public will be more nearly attained.

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Discussion follows paper of Drs. Krause and Lunsford, page 874.

DISTRICT HEALTH PROGRAM IN RURAL AREAS*

By IRL B. KRAUSE, M.D.,†
and
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Jefferson City, Missouri

For a number of years those of us engaged in public health work have pondered over a method of health administration which would be adaptable to sparsely settled rural areas markedly in need of health conservation procedures, yet too limited in resources to establish a whole-time county health department.

This paper was inspired by a knowledge that, with a depression nation-wide in character, the immediate future would not hasten health development in areas throughout the United States which, because of improvement in road building and more rapid transportation, would meet health hazards which were not a factor several years ago. In Missouri, throughout the section

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known as the Ozark playground area, in which district health units were in operation, the health hazards were even greater than in other sections of a like nature.

Before considering any public health organization I think it well to define and understand public health and its functions.

We like to quote from the lecture of Dr. W. G. Smillie, Professor of Public Health Administration of the Harvard School of Public Health, as follows:

"Public health is the science and art of preventing disease, prolonging life, promoting physical and mental efficiency, through organized community effort, and includes:

"(1) Sanitation of environment.

"(2) Control of communicable disease.

"(3) Education of the individual in the principles of community and personal hygiene.

"(4) The organization of medical and nursing service for the early diagnosis of disease, and the promotion of physical and mental hygiene.

"(5) The development of a social machine that will insure each individual in the community a standard of living, which is adequate for good health.

"Further, we must accept certain tenets regarding any public health program, such as the following:

"(1) The health of every person in the community is a social concern and a social responsibility.

"(2) No person can be allowed to lack all that is practical and really necessary for skillful treatment and his expeditious return to health.

"(3) Prevention of continued unfitness, whether due to late diagnosis or neglected treatment, or lack of suitable preventive measures, is the main function of public health."

We believe that Dr. Smillie's conceptions are in the main correct, but agree with him when he further states that in part the Utopia can never be reached.

We should like to present to you some of the ideas of our State Health Department concerning district health work, and to do so will outline the program carried out in Missouri during 1931, 1932 and the early part of 1933.

From time to time reference will be made to maps and charts, here presented, which have been prepared to demonstrate certain facts connected with district health work. We should be glad for you to examine these maps and charts at your leisure at the completion of this sectional program.

Early in 1931, certain funds were made available to states which had suffered from the drought. These funds were to be administered through the United States Public Health Service for emergency public health relief measures.

Missouri, being in the drought area, made a survey to ascertain the extent of damage to health from the effects of the drought. It was found that with only one or two exceptions the counties which suffered were south of the Missouri River, which, as you see from the map, bisects the State. It was further found that forty-five of these counties had no form of health service. The extent of the damage was determined upon a basis of demand for farm aid requested from individual counties. In reality, it was felt by the Health Department that persons not living on farms were more needy of the advantages of health conservation than were those living on farms and receiving some form of aid.

This particular area lying south of the Missouri River and extending to the southern boundary of the State was one of special interest and importance to the Missouri Health Department, since within it was included the extensive Ozarks recreation area. This is one of the most popular resort areas in the midwest; its resident population is more than doubled each summer, thus constituting a constant source of danger from certain diseases that may be brought in by visitors. Almost constant supervision of resort sanitation, public water supply, food distribution and sewage disposal was necessary to insure health protection to visitors and citizens of the State.

Viewing the chart which shows population and assessed valuation, one can readily see that this poor and sparsely settled area could afford little in the way of adequate health supervision. Realizing the extensive area involved, one can further understand that the Missouri Health Department could not finance the necessary personnel to insure proper health protection.

In considering the methods to be used in administering the funds for public health relief, it was realized that the relief was to be of an emergency character, but it was hoped that the results gained from such a program might serve as the basis for a permanent health program, financed by local funds, subsidized from governmental or private sources.

Manifestly, with the funds allotted, it was impossible to establish a health unit in each county. Further, had the funds been obtainable, such a mushroom growth would hardly have been stable. A plan, however, was desired that would furnish some of the advantages of a whole-time health service, adaptable to a large, sparsely settled area.

To critics of district health work may we say that one may consider the district health organization either a glorified health unit, or a miniature state health department. And as a preliminary justification of district health work, may I point out that practically all extension departments of leading educational institutions dealing with political or economic problems are getting away from the county as a unit and basing their investigations on larger areas. Further, students of economy everywhere are urging reallotment of governmental units over larger territory and decrying the waste, due to duplication of effort commonly seen as the result of numerous small political subdivisions. There was a time when the township might readily serve as an acceptable unit for health organization, but with the advent of good roads and means of rapid transportation, the township is now obsolete. We prophesy that within a few years the county will be to a large degree obsolete as far as health administration is concerned.

Considering relief for the individual counties in our drought area, it was found that ten counties in southern Missouri had whole-time health units. It was considered that this form of health supervision would be adequate. Consequently, they were not included in the districts later formed. In passing, we may mention that one by one we have seen these health units disappear as local funds were discontinued due to financial conditions.

Again consulting the map, it may be seen that from the forty-five counties five districts were formed, each including within its boundary nine counties. These districts were arranged as nearly as possible that each district might compare equally with others as to territory, population, assessed valuation and public health needs.

After we decided to attempt the district scheme in this area, plans were presented to Dr. Draper, of the United States Public Health Service, then Director of Domestic Quarantine. They were approved by him and funds allotted for the program.

To each district were allotted:

(1) An experienced public health physician, as director of the district.

(2) Five experienced public health nurses.

(3) A graduate sanitary engineer as sanitary officer.

(4) A bacteriologist (in four of the five districts).

(5) A clerk.

In explanation of the personnel:

The public health physician was chosen to direct the district activities, first, because it was felt that he could better assist local health authorities with their health programs and problems. At that time in Missouri the law made it mandatory for each county court to appoint a county health officer. The district plan did not contemplate the replacing of these county health officers who were under existing contracts with their respective counties. It was felt that the district health officer would be able to supervise and assist the part-time health officer in such a manner as to leave more time for them to administer medical relief to the indigent, inmates of almhouses, city and county jails. As to medical relief, it was, of course, realized that one result of the drought would be the increase in disease, especially tuberculosis, scurvy, pellagra, rickets and other forms of malnutrition, thus necessitating added medical care. The fact that part-time county health officers were present in each county relieved the district director of the necessity of doing any form of medical relief. In the second place, it was felt that supervision from an experienced public health physician would be of value in demonstrating to citizens and appropriating boards the economy and desirability of appropriating more money for public health programs. Third, it was felt that the district director would carry on a program of health education, making contacts with appropriating bodies, civic and medical groups, in addition to the administrative duties and the general supervision of the personnel assigned to the public health work in the district.

The public health nurses were chosen for their ability in their fields of endeavor. An especially trained nurse was chosen as supervising nurse for each district. She worked 50 per cent of her time in one county, which was originally intended to be a demonstration county, and occupied herself during the other half of her time in supervising and assisting the field nurses. Field nurses were assigned two counties each, to be worked as a unit. The nursing program was the usual program for public health nursing and will be briefly discussed later.

The graduate sanitary engineer was chosen because it was felt that sanitation throughout the Ozark region was a matter of vital importance. He would be adequately equipped to deal with county and city governmental groups along lines of sanitary improvements and construction. His residence in the district would tend to facilitate improvements in general sani-

tation, municipal and rural water supplies, sewage systems, milk sanitation and food distribution.

The bacteriologist was assigned to the district in charge of a small but well equipped laboratory to perform all laboratory tests except Wassermann, Kahn and other difficult procedures. Because of the geographical location in Missouri, and transportation difficulties, the physicians in this area had found it impossible to avail themselves of laboratory diagnosis early enough to be of any assistance. For this reason it was felt that the presence of a laboratory might stimulate interest in laboratory methods and early diagnosis of communicable disease. This proved to be the case. Further, it was felt that laboratory reports would serve as an index to district personnel as to where best to direct their efforts.

The program was left largely to the discretion of the district director. He of course submitted his program to the State Health Department for approval, but it was a departmental policy not to hinder the director in carrying out his program. In discussing the program it may be said that problems in Missouri are little different from those in other states.

In general, the program was as follows:

(1) *Law Enforcement.*—Enforcement of State health laws and the regulations of the State Board of Health and local ordinances pertaining to public health.

(2) *Health Education.*—Education of the people of the district as to cause and prevention of disease and the possibilities for community health promotion through organized community effort.

(3) *Child Hygiene.*—Education; maternal, prenatal, infant and preschool health clinics; examination of school children, including immunization clinics.

(4) *Sanitation.*—Inspection and recommendation in respect to safety of water and milk supply, method of excreta disposal and improvement of general sanitary conditions, including malaria control and prevention.

(5) Records and reports.

(6) Special activities, such as control of tuberculosis, malaria, trachoma and others.

(7) Insuring community participation in the program through the medium of an advisory public health committee composed of the part-time county health officer, one or more members of the county court (the appropriating board), superintendent of county schools, representatives of county-wide organizations, such as civic clubs, farm clubs, parent-teacher associations, *et cetera.* Incidentally this organization is one of the strongest public health factors to be interested if properly organized. The chart will show the relation of the committee to the district organization.

The districts are financed largely through Federal drought relief funds, the State contributing specialty service, such as dental, pediatric, chest, orthopedic and trachoma diagnosis, supervision of the field personnel, supplies and laboratory equipment.

It was hoped at the termination of the emergency period that local funds, to be supplemented by State funds, might be available for the continuation of the district program with five counties per district. The plan was for each county to employ its public health nurse and the five counties jointly to bear the expense of a sanitary officer, while the State furnished the salary and maintenance of the district director, the salary of the bacteriologist, plus laboratory equipment and supplies. The governing board of the district was to be composed of a representative from each of the county courts and the chairman of each of the county health councils.

It is only fair to say that this would have been accomplished had it not been for a 66 2/3 per cent reduction in funds available for the State Department of Health. Local interest was excellent from both citizens and appropriating bodies. In fact, thirty counties had signed up, through their county health councils, to continue on the above plan if State funds were available.

The advantages of this organization would be:

(1) The opportunity for the selection of trained personnel without local interference.

(2) Improved security of tenure of office for the district director, he being a field supervisor for the State Department of Health.

(3) Improvement in cooperation between the district health officer and the practitioner due to the fact that the district director, by the nature of his position, would not be considered a competitor in the field of medicine.

(4) Impartial management of the public health work in counties comprising the district.

(5) Ability to employ graduate sanitary engineers instead of sanitary inspectors. It is understood, of course, that inspectors would be

needed temporarily for individual home sanitation. The objectives, however, would be:

(a) Municipal sanitation.

(b) Highway and resort sanitation.

(c) Milk sanitation.

(d) Construction and maintenance problems requiring engineering ability.

(6) Nurses, while working in individual counties comprising the district, would be available under this plan for assignment to other localities in an emergency.

(7) Economy of operation is one of the most salient reasons for institution of this scheme in sparsely settled areas.

(8) An opportunity to develop public health education unselfishly, which, after all, means a development of a local health consciousness which would lend to individual and community cooperation, demanding adequate appropriation to advance public health.

(9) Avoidance of duplication of effort, which is often seen in counties.

Results of the district work are enumerated in chart form, with comparisons of work done in the ten whole-time county health departments which were operating at that time. The period of time is the same in both instances, namely, fifteen months.

In comparing units and districts, it is unfair to compare whole-time county health units in Greene, Jackson and St. Louis Counties. These three counties are very populous and have a thickly settled area with a very high valuation. The other counties are comparable to the districts. Note especially that the five districts served a sparsely settled population of 632,426 having an assessed valuation of $470,000,000 for an average of 14,000 population per county in the district and an assessed valuation of $10,400,000 as against ten whole-time county health units serving a population of 1,041,203, or approximately one-third of the State population, and having an assessed valuation of $1,329,022,780 for an average population of 104,000 per county and an average assessed valuation of $132,900,000 per county.

Total cost of the five districts, excluding the part-time county health officers who were under contract with the counties at the time the districts were formed, was $159,558.90 as compared to $167,394.32 for the ten whole-time county health units, for an average per county for the district of $3,545.75 over a fifteen month period at $236.38 per month as compared to the health units' $16,739.00 per county for the fifteen month period at $1,116.00 per month.

Further note the results especially of measures of a preventive nature:

	Units	Districts
Typhoid vaccination	22,186	11,571
Smallpox vaccination	8,583	11,594
Diphtheria toxin-antitoxin	14,845	44,510
Schick tests	2,608	7,011
Total	48,222	74,686

As was said before, there is little opportunity for adequate comparison between the ten counties and the five districts, when St. Louis County with its 200,000 or more population and large valuation, Jackson, Greene and Buchanan Counties are included. As a matter of fact, these four counties should be listed as urban health centers rather than health units. To make the comparison more definite, I have taken six counties, Boone, Dunklin, Marion, Miller, New Madrid and Pemiscot, all having health units. These counties are more comparable in population distribution, assessed valuation, and budgets for health work. The total population of these six counties is 184,561, having an assessed valuation of $131,659,162 for an average population of 30,790, and an average assessed valuation of $21,943,195. The total cost of operation of these units was $55,589.40 per year, or an average of $9,264.90 per county per year. The per capita cost of operating one of these units was $0.30 plus. The average cost per county, per year, in the district was $2,833.05, and the per capita cost per county of the district, estimated in the same manner, was $0.20 plus.

In conclusion, we believe that the district health scheme operated in sparsely settled rural areas will furnish adequate health protection more quickly than if we should delay institution of a full rounded health service because of financial conditions.

Second, a whole-time district health service will furnish to these areas a health service undisturbed by political preferment. The advantages of this would be the selection of experienced personnel which otherwise could not be obtained.

Third, the district health service can be instituted at a cost to the tax payer in small rural counties much less than that of a full-time health unit and at very little more expense than full-time nursing.

Fourth, there will be less friction by the practicing physicians and the health officer, due to

the vastness of territory and this lack of personal competition will stimulate more thorough cooperation on the part of the medical and dental groups.

Fifth, district health work will allow a more adequate organization by the community, due to the educational work, concrete demonstration and economic saving possible under this form of health work.

DISCUSSION (*Abstract*)

Papers of Dr. Haney and Drs. Krause and Lunsford.

Dr. D. V. Galloway, Meridian, Miss.—By the beginning of the Twentieth Century urban health departments had reached a high degree of perfection in organization and administrative technic. By 1925, the county health department, or equal rural unit of government, was well understood and certain fundamentals of organization were fairly standard.

Now, we may be said to be experimenting in the rural public health field in supplementing forms of organization and administration. Two of these additional conceptions of organization we have just heard discussed. Outside and over the county unit the district; within and subject to the jurisdiction of the county unit, the rural health center.

I heartily agree with Dr. Haney's statement that the rural health center is an attempt to decentralize and individualize health service to a greater extent than is possible in the larger county unit. This decentralization of the county service has two immediate effects: (1) it gives the small community a physical symbol of the county health service; (2) it makes available in the small area served by the health center a definite, continuous organized program, especially fitted to the needs of this community, which consists of possibly 1,000 persons, and covers an area of from three to four miles. The center may be in actual walking distance of 90 per cent of the people to be served.

Dr. Haney mentions the health council. In Lauderdale County, Mississippi, we are securing similar results by employing existing lay groups instead of an official health council. It may be that we shall eventually work up a health council, but that is a development of the future. It has been suggested that the use of all existing lay groups interested in health is a simple and often effective way of securing community support of the health program.

We have in operation in Lauderdale County, at the moment, five such centers as have been described by Dr. Haney and, while we have not reached the volume of work reported by him, we attribute this to the fact that all our centers have been established within this year.

We are most enthusiastic over the future possibilities of the health center plan.

An emergency program may differ materially from a permanent program and if I should seem too critical of some aspects of the program presented by Drs. Krause and Lunsford, they will feel just as free to set me right. It may be that some of our differences of opinion are due to our different experiences in health work. They have probably had experience with both county and district health work, while my own experience has been limited to county health work.

As to the statement that the county unit will become obsolete as a form of health organization in the near future, may I most respectfully beg to differ decidedly. The county will not become obsolete as a unit of organization so long as it has at least 10,000 population, a valuation of more than ten million dollars and its extent is not less than 625 square miles in area, although some counties of this valuation will need state and/ or Federal financial aid. The objective of allowing the part-time county health officer more time for medical relief activities was most unfortunate and instead the objective should have been to free the part-time county health officer from this medical relief duty in some manner so that he might have more time for legitimate public health work. Medical relief is in the same category with food and work relief in being a responsibility of the regular social agencies of the community.

(1) The unfettered selection of trained health personnel is a most worthy aim. Petty politics at this point can be a most disrupting force.

(2) Security of tenure of office, as stated by the authors, is also desirable if it does not lead to undesirable chrystalization.

(3) The question may be asked, however, why any health worker should be concerned about criticism of a program which is confined strictly to public health activities.

(4) Impartial management is a desirable aim for county health work.

(5) One sanitary engineer for five or nine counties cannot in my estimation be considered adequate as a substitute for one sanitary inspector per county.

(6) Great care should be exercised in moving nurses from one assignment to another on account of interrupting the continuity of service.

(7) Economy of operation must be justified by the most adequate service possible and is not a desirable end in itself. It may be like unto the statement of a certain relief worker in one of the large cities in the South who proudly stated that she had been able to turn back to the city more than $10,000 of funds available to her by voiding many relief requests.

(8) Development of public health education is a most needed function in all health departments. As to the statement that there is a duplication of effort in county health work, I should like to request a more specific statement, as all county health departments with which I am familiar are spreading their work too thin at the present time.

In the statement that these districts cover sparsely settled areas of low economic valuation, I must beg to state that the figures submitted do not seem to bear out this conclusion. The counties average a population of about 14,000 and a valuation of more than ten million dollars each and should have all been able to support at least the minimum staff of a county health department, that is, a health officer, nurse, sanitary inspector and clerk. Even so, units of this size would have still been inadequate to the health services required by a population of 14,000 people. The organized counties in Missouri, if I understand correctly the figures in this paper, were spending on the average about 30 cents per capita per year, and it is well known

that in no area in the United States can adequate health service be furnished for less than $1.00 per capita per year.

It is not valid to cite these expenditures as proof that a district is more economical. It simply appears that both counties and districts have inadequate health service.

It seems to me that we must set up some such standards of public health work as that represented by the appraisal form for rural health work of the American Public Health Association and if adequate funds for such a program are lacking, the proper procedure is to concentrate on the real problem of finding adequate funds instead of trying to make out with a less efficient type of organization merely because it is less expensive.

In conclusion, may I quote from the findings of the Committee on Administrative Practice of the American Public Health Association that health services are personal services and to be effective a health program must be based on the number of persons to whom health service is to be rendered.

Dr. Wilson G. Smillie, Boston, Mass.—The striking thing about the presentations by Dr. Lunsford and Dr. Haney is that they both show clearly that we have not developed a standard technic for county health administration, nor is it advisable that we should do so. Each of them has faced his own local situation and with the resources at his command has attempted to work out a feasible program to meet those needs.

Dr. Haney is to be congratulated upon his success in decentralizing his health department activities. By this plan the activities of the health department are carried directly into the community life. The people feel that the health nurse and her activities, in fact the personnel and efforts of the whole health department, belong to them and are for their direct benefit. Thus the health unit becomes a part of their daily lives. I have seen this plan work with great success in Hungary and Jugo-Slavia, in rural communities not unlike our own, and I believe that it can be applied with success in our own county health unit organization.

TWENTY YEARS OF COUNTY HEALTH WORK IN NORTH CAROLINA*

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The first county health department in North Carolina was established June 1, 1911, in Guilford County (Greensboro), the earliest full-time county health department in the United States. North Carolina thus started this type of local health service. Like all pioneers, it followed the method of trial and error. Notwithstanding the tribulations incident to this procedure, it has learned some lessons and has continued in the vanguard of progressive states in this field of endeavor with very few steps backward in the twenty-two years of its history.

This program was inaugurated under the provisions of a law passed by the general assembly of 1911. The essential features of the law are: (1) provision for a county board of health, consisting of the chairman of the board of county commissioners, the mayor of the county seat town, and the county superintendent of education as ex-officio members, who elect two physicians (later, in 1931, one dentist) as additional members of the board; (2) authorization for the appropriation of funds; (3) authorization for the county board to adopt regulations, the violation of which is a misdemeanor, and (4) the consolidation of the offices of the county physician and county quarantine officer under the county health officer. Time has caused doubts as to the advisability of having a county board of health controlled by ex-officio members. As will be pointed out later, considerable embarrassment has been occasioned by the provision requiring the county health officer to perform the duties of county physician. In other respects, this law has stood the test of time with a rather surprising degree of satisfaction.

In 1912, a second county, Robeson, was added to Guilford, and in 1913 ten full-time county health departments were organized, of which seven have continued without interruption to the present time, a total of twenty years. Five of these counties, Guilford, Durham, New Hanover, Buncombe and Forsyth, may be considered wealthy counties, since each contains a city of more than 30,000 population, lying in a prosperous section. Two other of these counties, Sampson and Robeson, can be classified as rural counties, each having an area of approximately 900 square miles, with a scattered population of from forty to sixty thousand, and assessed valuations of from twenty to forty million dollars in 1930.

In 1915, three of the original counties dropped out and one new county was added. From that time until 1931, yearly increases have been made to this list of counties with very few casualties. Briefly stated, up to the present time, a total of fifty-four counties have started some type of full-time county health work. Of these, only six have suspended operations for any considerable

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period of time. However, as stated below, twelve of these full-time counties are not standard units and the total must be revised accordingly.

STATE AID TO COUNTY HEALTH DEPARTMENTS

It was not until July 1, 1917, that a subsidy from the State Board of Health was available to county organizations. In that year, the State Board of Health and the International Health Board shared equally a 50 per cent subsidy for budgets not exceeding $6,970.00. At that time only nine counties were granted this aid; the other four which were in operation at that time continued as independent organizations. During the biennium, 1917-1918, an amount of $35,175.83 was allocated to counties, from both sources, under this arrangement. In succeeding years, this expanded to a maximum of state funds allocated for this purpose of $123,415.00 in the fiscal year 1929, with every county health department in the State sharing in the distribution.

When extra-county financial assistance was first inaugurated, it was with the idea that a gradual reduction would be made from year to year in each subsidy until the budget, within a few years, would be provided entirely from local appropriations. It soon became evident that the principle of outside financial assistance was a policy which the State Board of Health should continue indefinitely.

Prior to the initiation of subsidies to county health work, most of the efforts towards standardization of service were futile. County health officers resented as interference the efforts of the State Board of Health to guide or direct their programs. On June 16, 1914, nine county health officers presented to the State Board of Health a petition which may be summarized as follows: that the chief of the Bureau of County Health Work be named by the Full-Time County Health Officers' Association; that the Chief of the Bureau of County Health Work be a representative of the above Association; that only such reports be submitted to the State Board of Health as shall be agreed upon by the Chief of the Bureau and the above Association; that no system involving competition between the various health officers, or comparison of their work, shall be given publication in any way; that the State Board of Health shall not interfere beyond recommendations when requested in the selection of local health officers. After the extra-county financial assistance became available, this antagonism to central authority gradually gave way. Today, every county health department in the State receives State assistance.

At first the county paid 50 per cent of the total budget, the State 25 per cent, and the International Health Board 25 per cent. Later, funds were prorated according to earnings of county departments as calculated by the cost equivalent system. Still later, the State Board of Health paid one-half the salary of the county health officer and one-half the salary of an additional nurse or sanitary inspector. The motivating idea of assisting with the salary of the health officer was the increasing of that official's salary to a point commensurate with his qualifications. In actual practice, however, it placed a premium on selfishness, the health officer all too frequently working to increase his own salary and making no, or little, effort to secure additional members of his staff. This necessitated a change back to the plan of having the State allocation a definite percentage of the total budget. However, since State funds were limited, the maximum allocation to a county health department actually fell short of the amount required for an adequate budget. In other words, when the State's participation was 33 1/3 per cent, the maximum allocation was $2,500.00, which was insufficient to pay one-third the cost of a four-piece health department, with adequate salaries and contingent fund. It would have been better if the percentage of participation had been smaller, thereby permitting the state to share on that same percentage in an entirely adequate budget.

ACTIVITY REPORTS

In the beginning, financial statements and reports of activities were simple and brief. There has been a gradual evolution in the complexity of these reports. Notable milestones in the development of reports are the cost equivalent system, which was started in 1922, and continued with elaborations until 1927.

The cost equivalent system arose from the concept that public health must justify itself on a financial basis of services rendered. Dr. Rankin and his collaborators estimated the monetary cost which could be assigned to each item of service, so that the value of services rendered could be summed up, county health departments compared, funds prorated, and data presented to appropriating bodies in an appeal for a continuation or increases. That system was

not successful, for most patently a large part of the services are of that indefinite, intangible and imponderable nature to which no uniform money cost or value can be attached.

The cost equivalent system was replaced by a report based upon the appraisal form. In the revision of report forms, it would seem that the activating motive has been always to make them more comprehensive. At present the outstanding need in regard to activity report forms, especially as they concern small organizations, is a simplification. Larger health organizations need a comprehensive form. Smaller organizations should have an abridged form. If a report form were designed comparable to the international list of causes of death for large departments, and condensed forms for medium and smaller departments, comparable to the intermediate and abridged list of causes of death, a real contribution would be made. Reports, as well as records, should be the servant of the department rather than its master.

THE NURSING COUNTY

In 1923, a new idea was introduced in North Carolina, namely, that of providing poor counties with a health department consisting solely of a nurse. In 1927, one of our counties which had been maintaining a full-time county health officer decided to economize and became a nursing county. This practice was followed in 1929 by a second county and in addition two new counties were organized as nursing counties. There were seven such nursing counties in 1930, when an inspector county was started in a mountain community which was sorely in need of a sanitary program. By 1931, there were four inspector counties. Three of these still survive.

The so-called "nurse unit" counties, in which the full-time public health personnel consists of a nurse alone, have not been, in North Carolina, the precursors of a standard-staffed health department. Some of these units are most commendable and are in charge of women of great capability and devotion to duty. However, in this State the nurse unit not only has not led to the complete county health department, but actually has been a block to the achievement of the goal. They must "sell themselves," and, being capable, they sell themselves too well. Also, it is difficult for an individual standing at the head of a program for some years to buckle under and turn it over to a successor and work in a subordinate capacity. The point here made is that the way to get a four-piece health unit is to start with one. It is only deceiving yourself to think the other method will achieve the result.

THE INSPECTOR COUNTY

With the sanitary inspector county, other factors may obtain. Usually a lone inspector is put into a county that is unable to afford a complete unit, and yet where there is a crying need for the most elemental sanitary improvement. Rarely will an inspector consider himself to be rendering complete service. It is believed, with some justifiable basis, that the inspector can go into a new county and "sell" a four-piece unit. However, if he has not achieved that goal in two years, he will never achieve it. It is a pretty hard strain on human nature to go in and work up a job for someone else.

THE HEALTH DISTRICT

Since North Carolina has one hundred counties, and since only approximately forty of these are financially able to maintain a standard-unit health department, a plan was devised to provide for health districts comprising from two to five counties, with the State Board of Health paying the salary of the district health officer, and offering a subsidy to the counties in the district for the employment of nurses and sanitary inspectors. With this plan we have been unable to make progress, largely for the reason that counties are jealous of their neighbors and are unwilling to unite with them in a common effort. Today, only one health district has been organized and its plan of financial support is largely that of philanthropy. It has, however, demonstrated the ability of a competent health officer to administer a health program in three counties.

There is a demand that the State provide whole-time health service to every county. Had it not been for the unsettled economic situation, the last general assembly would probably have given serious consideration to this subject. Since the State of North Carolina has taken over the maintenance of all public roads and operates the public school system, it is probable that a state-conducted health program will be discussed more and more during the next few years.

CONSOLIDATION

The consolidation of city with county health departments has taken place in all but six of our counties maintaining standard-unit health departments. One of these cities lies within two counties. Where consolidation has taken place, successful and economical administration has been achieved.

INDIGENT PRACTICE

Recent events have shown the error of combining the position of county health officer with that of county physician. The original idea was that with very little addition to the funds already being expended for a part-time county physician, a full-time county health officer could be employed, who, in addition to rendering medical service to prisoners and other county charges, would be able to carry on a program of public health. This proposal appealed to county commissioners, and the promise has remained to plague the county health officer. During the recent economic depression it has frequently happened that a large section of the county population has been temporarily moved over to the indigent list and the county health officer has thereby become the overworked servant of the county commissioners and the unwilling competitor of every private physician in the county.

IMMUNIZATION CLINICS

The programs of county health departments have been markedly affected by certain activities started by the State Board of Health. Immunization clinics were first conducted by paid employes of the State Board of Health. In the beginning, these were recently licensed young physicians and medical students who worked during the summer months for nominal salaries, a physician and student working together. They traveled from community to community by horse and buggy, dispensed their own propaganda and organized their own clinics. They soon incurred the ill will of the medical profession in some sections, which necessitated a change of plan. In counties having whole-time health departments, we have the modern evolution of this idea. In counties without health departments, the immunization clinics are now conducted by private practitioners who receive fees for each complete immunizing treatment administered during the campaign.

ORAL HYGIENE

Beginning July 10, 1918, school dentists were employed by the State Board of Health. Today, treatment has a very minor part in the oral hygiene program and is now used only for demonstration purposes. The larger aspect of mouth health is brought definitely to each child who is fortunate enough to have the benefits of this service. The value of this work has been so well established that it is considered an essential part of any well-balanced local health program. At the present time, however, we find this activity frequently in competition with our health departments in their campaign for public funds. We have yet to devise a method for the elimination of this conflict.

PRIVY LAW

In 1919, the general assembly enacted a statewide privy law. The enforcement of this law was first the responsibility of the inspectors employed by the central organization. In counties having whole-time county health departments, this work was gradually transferred to the county sanitary inspector, with the State Inspector acting in these counties only in a supervisory capacity. Today, each worth while health department has its own sanitation program.

TONSIL-ADENOID CLINICS

Tonsil-adenoid clinics were started in 1919 by the central organization. The original aim of these clinics was to popularize this phase of child hygiene, with its attendant improvement in health, success in school, and so on. It was a five-year program which was continued for twelve years. Although conducted as a demonstration, it was looked upon by a few specialists as a means of providing treatment which came in direct competition with private practitioners and was, thereby, opposed by them. In the end, it almost wrecked the standing of the State Board of Health with some elements of the medical profession; but no enterprise ever started by the Board was more successful in obtaining the support of the legislature and the people. This activity was definitely discontinued on a state-wide basis in 1931. The original idea is being carried on in a number of our counties through local initiative, with the best of success and the hearty support of the practicing physicians.

TUBERCULIN TESTING

The tuberculin testing of school children was first started as an activity of the State Sanatorium. Today a considerable number of our health departments have incorporated this procedure as a part of their own program. However, they work under the supervision and with the assistance of the State Sanatorium.

QUALIFICATIONS OF COUNTY HEALTH OFFICERS

For nineteen years, the only requirement for the candidate for position of full-time county health officer in North Carolina was that he be a graduate physician, licensed to practice, of good moral character, and a member of his

county medical society. In 1932, the new contracts were revised to provide that he must either have completed a course in public health in a school approved by the State Board of Health or else have had two years of "satisfactory" experience as a public health official. This is interpreted to mean that all new appointees would have to be from the list of those completing courses in public health. It is too early to give results of experience in applying this rule, but its adoption in this State is to some extent to be considered as an achievement of high order.

DISCUSSION

In this State, as in most others, a period of rapid growth in the development of county health work was followed after some years by a period of reaction characterized by a falling-off of interest and enthusiasm, a decline in value of service rendered, and even a decrease in the number of county units rendering service. This has occurred so frequently as almost to take on the appearance of inevitability, a sort of biologic law of growth and decay. A little closer examination, however, reveals that this is not as true as might seem evident. Certain conditions are most likely the source of trouble, without the necessity of invoking a divine law to explain it. Such conditions are the lack of continuous, aggressive, trained leadership in the supervisory positions at the State Board of Health, the heads of the county departments themselves, and the too frequent employment as county health officers of physicians lacking in special training for public health work, or in basic fitness or adaptability to this special branch of medical practice. An error in leadership was the original assumption that a health officer alone, unsupported by any other personnel, could render satisfactory, complete service in any area. Only a man of most remarkable attainments and energy can do that. Another error in leadership was the pursuit of the goal of a large number of county health departments rather than the less spectacular but more permanent one of organizing only the better type of department. This frequently resulted in the assenting to organization of departments with budgets too small and totally insufficient to offer salaries attracting capable, trained personnel, even if such were available. The mortality in county health departments can be greatly lessened if the health officer starts off with training in public health that is thorough and practical rather than getting his experience entirely at the expense of the community he is to serve. Another item entirely applicable in this State is that there has been a lack of close administrative supervision of the work of these county units. Too frequently the sole duty seemed to be to secure the organization and continuance of the county health work only through a cash contribution. This has violated a very necessary element of satisfactory administration.

SUMMARY

Twenty years of experience with county health work in North Carolina has convinced us that:

(1) A county board of health should be composed of members whose principal official allegiance is to the health program of the county. Ex-officio members cannot be expected to place public health work first.

(2) County health departments should be unhampered by demands for the treatment of sick indigents.

(3) The state should subsidize county health work. The method of allocating the subsidy should encourage the adoption of a balanced program.

(4) The state should offer to the local health program a consulting and coordinating service.

(5) Activity and financial report forms should be adapted so as to conform to the size of the local unit.

(6) Definite and inflexible professional qualifications for the county health officer, and perhaps for members of his staff, should be adopted and enforced.

(7) A balanced program, which can be provided only by a qualified health officer, a trained public health nurse, an efficient clerk, a competent sanitary inspector, and a dentist who understands oral hygiene should be required of every local health department that is to receive state aid. If the county is unable to pay its share of the cost for this type of service for an entire year, it should at least have a part of the service which can be rendered by this organization.

(8) No system of local health service can be considered as satisfactory until provision is made for every section and county in the State. Devising a method of supplying this service is a challenge to public health administrators.

DISCUSSION (*Abstract*)

Dr. John A. Ferrell, New York, N. Y.—The movement in the last twenty years of county health work

has been characterized by experiments in which the trial and error method was employed. As Dr. Hamilton has adhered closely to the historical record, the only questions open to discussion are his conclusions as to sound principles of organization and practice. It is gratifying to note that his opinions are in general accord with those of others who have also had long and varied experience in the organization and operation of county health departments.

While all of the features about which he particularized are important, those relating to restricting appointments, both in the state and in the county organizations, to able and professionally trained personnel are of vital importance.

The county health movement is characteristically an American development having a relatively recent origin. It would seem desirable that in each state where the movement has made headway the health department should carefully compile and publish a history of the development in each county. Such records will be of inestimable value to students of public health. Within the next two years the statistical facts relating to the various county health organizations, including number and kind of employes, funds expended, and the sources from which derived, may be published through the cooperation of the United States Public Health Service and the Rockefeller Foundation.

Before the county health movement can become state-wide and approach a reasonable degree of adequacy, methods must be devised for providing more generous budgets, and greater emphasis must be placed upon professional qualifications of the personnel.

Dr. W. K. Sharp, Nashville, Tenn.—Since only 28.4 per cent of the counties and districts in the United States have been provided with full-time county health personnel, North Carolina should be proud of the fact that it is more than twenty years ahead of 71.6 per cent of the rural counties and districts in the United States. It is almost useless to undertake to develop a county or district health department program unless extra-county financial assistance is available. According to the reports of the U. S. Public Health Service, October 6, 1933, nearly 95 per cent of the 581 counties, townships or districts with health service under full-time local health officers at the end of December, 1932, were receiving financial assistance from extra-county sources. This indicates the value of extra-county financial assistance. This is not necessarily a subsidy, but is a definite obligation and responsibility of the state and Federal governments in performing their official duties in the development of a public health program. Extra-county financial assistance is second only in importance to the personnel. It will act as a stabilizing influence on tenure of office, program, plans, policies, and even politics. Every town and county is eager to secure state recognition in selecting its personnel and with the proper leadership and guidance from the state health department financial assistance can be withheld until proper personnel, trained in public health, can be selected and approved. Too much stress cannot be placed on this point.

Those counties with sanitation officer and public health nurse working alone, or together, or the combined counties to form districts, all have done good work and have their places in a rural health program, but any and every one of them should be organized with the specific understanding that they are modified and operating only as temporary projects. This is especially true with the former two, and Dr. Hamilton is probably correct in his statement that the way to get a four-piece unit is to start with one. I want to stress the point that no one should be led to believe that a four-piece unit can render adequate service. The service rendered by a four-piece unit is more nearly adequate than that rendered by a modified plan.

There is a sharp line of demarcation between the activities and duties of a well organized, up-and-going health department and those of treating the indigent sick or paupers, and this should be understood by local appropriating powers. This activity causes disturbances in local medical societies, state medical societies, and in the general assembly. By all means, wherever possible, separate these two activities.

Immunization clinics are usually made the most spectacular part of any health department program and cause the greatest grief on the part of the medical profession. A full-time county health department that neglects a county-wide immunization program is falling short of its duties, unless definite arrangements can be made for the medical profession to assume this responsibility, but my experience has been that the medical profession will not do it. Therefore, the county health department will be forced to do it.

Most states do very little on a state-wide basis in the development of a plan for sanitary privies. This is a part of the local program. North Carolina and Alabama and a few other states have done remarkable work in the construction of sanitary privies and probably if we ever gain much headway a privy law will be necessary.

The selection and training of personnel go hand in hand with finances. We have all wasted enough time in selecting untrained public health workers. It is just as essential for a public health worker to have a postgraduate course of two to four-year intervals as it is for a general practitioner or surgeon, and for the same reasons.

To summarize briefly a few of the essentials in the program are:

(a) A small, highly trained, efficient state health department with as few bureaus as possible to provide technical assistance to the local areas.

(b) A suitable, well trained, competent director of county health work.

(c) Definite financial assistance for the development of a county health unit system on a state-wide basis.

(d) A uniform procedure, such as plans, policies, program, reporting and records.

(e) An introductory course should be required before the initial appointment is made (whether it be a physician, nurse, or inspector) and should be in the nature of graduate work of university standing. Unless there are such university affiliations, teaching methods and standards are not likely to be of high grade or adequate.

It is just as important to provide subsequent training as it is the initial training. The local personnel is apt to become self-satisfied in performing the daily routine. Even though the state keeps close tab on the local situation, the local personnel will not keep abreast of the times without refresher courses.

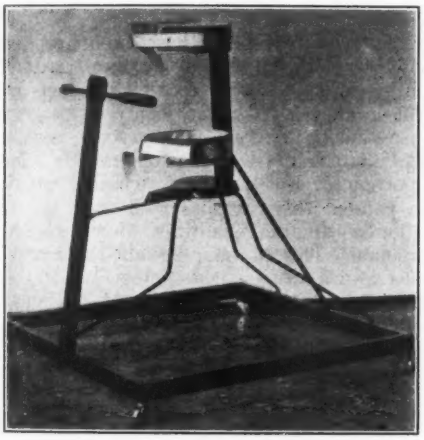
(f) There is practically no use to develop a full-time local health service unless provisions are made to furnish real advisory and supervisory service.

NEW INSTRUMENTS AND APPARATUS*

By S. RALPH TERHUNE, M.D.,
Birmingham, Alabama

The apparatus shown in the illustration as devised by Dr. E. Laurence Scott is used by us in the Crippled Children's Clinic in cases of spastic paraplegia, infantile paralysis, congenital muscular weakness and various other conditions involving the lower extremities and the back. I present this apparatus because of its especial adaptability to children for walking training in cases of leg and back weakness, and because it can be constructed easi'y by any mechanically minded person at a very moderate cost.

The walker consists of a square base-frame constructed of four sections of wood, each ¾ by 2 by 32 inches, joined by angle irons and screws, and mounted on ball-bearing casters. The seat is also made of wood cut in the shape of the ordinary bicycle seat, and is supported by three ½-inch bar iron uprights attached to the base and bent in the manner shown. The front bar is attached to the center of the front side of the frame and hence does not interfere with leg movements. The height of the seat is to be determined for each individual case so as to allow the child's feet to be placed squarely upon the floor while sitting comfortably. (A seat adjustable to different heights would not be practical, as this modification would tend to destroy the stability of the apparatus.) The wood upright back support attached to the back of the seat is ½ by 2 by 16 inches and is braced by a small, straight, bar iron rod fastened by screws to the junction of the middle and lower third and extending to the center of the back base-frame. Two spring steel supports padded with soft leather or felt are attached to this back support; one to be fastened around the patient's body just below the iliac crests and the other on a level with the axillae, so as to allow free use of the upper extremities while keeping the body rigid in the upright position. Both supports are drawn tightly around the body by means of web straps and buckles fastening in the front. A handle post is provided by attaching a wood upright to the center of the front of the base-frame and bracing it in a slight, back-tilting position by a small, straight iron bar running horizontally from the front of the seat to the post. Ordinary tricycle handlebars are the best grips that can be obtained when attached to the top of the post as illustrated. The height of the handlebar is to be estimated so as to allow firm gripping of the bars without strain and without assuming an unnatural position.



This apparatus is very durab'e and yet light enough for a small child to push around by walking movements without danger of falling. It presents a distinct advantage over other types of walkers more commonly used in that the back is given support while the patient is being educated in the use of the lower extremities.

818 Woodward Building

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EDITORIAL DEPARTMENT

SOUTHERN MEDICAL ASSOCIATION
Twenty-Eighth Annual Meeting
San Antonio, Texas, November 13-16, 1934

THE SAN ANTONIO MEETING

It is now a matter of little more than six weeks before the twenty-eighth annual meeting of the Southern Medical Association. Hotel reservations have been numerous. The last Texas meeting, in Dallas in 1925, was the largest in the history of the Association, and there is every reason to believe that the San Antonio meeting will not fall far behind it.

A general outline of plans for the convention was given in the September issue. Their successful progress has been uninterrupted. The first two days will be occupied with clinical sessions. On Tuesday there will be six of these: a session on general medicine, surgery, pediatrics, obstetrics and gynecology, ophthalmology and otolaryngology, and dermatology. On Wednesday, there will be a general clinical program for all specialties. On Tuesday and Wednesday a few of the special groups will convene and on Wednesday several of the smaller sections. Thursday and Friday will be given over to section meetings.

The scientific and technical exhibits promise to be of unusual interest. Round table luncheons will offer informal discussions of many moot points in medical practice and in medical economics. Social features of the meeting are felicitous for both men and women. Facilities for those who wish to entertain themselves by hunting, fishing or other pursuits are abundant.

The complete program will be published in the November issue. This is a meeting which no one can afford to miss.

CAUSE OF CANCER

Surgical and radiation treatment of malignant disease remove or destroy the cancer and surrounding tissue. They are local treatments. If cancer is ever shown to be a systemic disease, then the tremendous literature on the technic of radical removal of malignant lesions may become as obsolete as that of pouring hot oil into wounds.

Experimental cancer has been produced chiefly by local measures, by local irritation. Painting of rabbits with coal tar products may result in cancer.[1] Human cancer greatly increases among workers with certain coal tar dyes.[1] Sarcoma of bone was observed in a large proportion of the radiant watch dial workers, who pointed their brushes with their lips and swallowed minute quantities of a radioactive compound. This also may be called an irritation cancer.

There are other methods of inducing tumors or malignant disease. Transplantable strains of rat sarcoma and mouse carcinomas have been maintained and studied for many years. The fact that these are transmissible in series has lent some support to the belief that cancer may come from a germ. Maud Slye's[2] theory of inheritance of cancer and production of cancer by selective breeding is well known. Tumors, artificial placentas, follow injection of certain extracts of the corpus luteum plus irritation of the uterine epithelium.[3] It is not difficult to produce rabbit tumors by injections of pregnancy urine. Several compounds closely allied to theelin have been called potent carcinogenic agents.[1] The possible endocrine origin of cancer has interested many investigators in the past few years. The announcement in 1931 of cure of cancer by means of a suprarenal extract[4] arrested immediate attention and was widely acclaimed for a brief period because of the particular receptivity of that time.

1. Coal Tar Derivatives and Carcinoma of the Bladder. Editorial, Sou. Med. Jour., **27**:371, April, 1934.
2. Slye, Maud: Inheritance Behavior of Cancer as a Simple Mendelian Recessive. Jour. Cancer Res., **10**:15, 1926.
3. Goldstein, L. A.; and Tatelbaum, A. J.: Physiology of the Corpus Luteum. Amer. Jour. Physiol., **93**:14, 1929.
4. Coffey-Humber Cancer Treatment. Editorial, Sou. Med. Jour., **23**:564, 1930.

Attempts to produce experimental tumors for study have been much more successful than attempts at curing them. Murphy and Sturm,[5] of the Rockefeller Institute, however, have recently reported a method of treatment which has some curative effects upon laboratory malignancy. It is an old idea that normal tissue contains a growth-inducing and a growth-inhibiting factor,[6] which preserve a balance among the many different cells of higher organisms. Murphy and Sturm considered that the growth balancing factor might be most abundant in embryonic, or rapidly growing tissues. They prepared a water suspension of dried normal embryo skin and another from the placentas of several species of animals. Tumor tissues incubated with these were inactivated, failed to grow; and in a considerable proportion of mice treated with the extracts, the inoculated tumor failed to develop. Its growth was retarded in practically all cases.

The effect of the growth-inhibiting factor on spontaneous mouse carcinomas, as well as on experimental or inoculation carcinoma, was studied. In some of these experiments, mouse tumors were removed by a radical operation and the wound bathed with placental extract, or with embryo skin extract, which was sealed into the tissues with collodion. There was evidence of suppression of local recurrence, following particularly the treatment with placental suspension. The same extracts were injected intraperitoneally at weekly intervals into mice with established spontaneous tumors. Nearly 70 per cent of the tumors showed no further growth, and the animals lived out their normal life span. Ordinarily, say Murphy and Sturm, only a fraction of 1 per cent of tumors of this type fail to show a progressive course. More than a fifth of the tumors treated by intraperitoneal injections regressed completely and disappeared, something which practically never happens in the untreated.

Because of the effect of certain hormones in originating abnormal growth, and because of the high hormone content of the placenta, the studies possibly support a hypothesis of endocrine origin of cancer. At least they do not contradict it. The known high hormone content of the placenta is of interest in this connection.

The conquest of malignancy, though slow, shows every sign in the past few years of being a little nearer accomplishment.

5. Murphy, James B.: and Sturm, Ernest: A Factor from Normal Tissues Inhibiting Tumor Growth. Jour. Exper. Med., **60**:293, Sept., 1934. Idem, Effect of a Growth-Retarding Factor from Normal Tissues on Spontaneous Cancer of Mice. Idem, p. 305.

6. Burrows, M. T.: Further Notes on the Relation of Nutrition to the Development of Cancer. Proc. Soc. Exper. Biol. & Med., **26**:574, 1929.

GLEANINGS FROM RECENT JOURNALS

Excretion of Barbiturates.—Barbital was introduced to medicine under the name of veronal, a sedative. A great many of the barbiturates are now in use as hypnotics. Though variations in the hypnotic properties of the numerous derivatives are acknowledged, it is said that notable differences have not been shown in their toxicity.[1] Koppanyi and his collaborators[2] at Georgetown University have produced evidence that suggests a difference in the path of excretion of the different compounds, and a difference in the toxicity for different species, and possibly for human beings with damaged kidneys.

Barbital in mammals, they say, is excreted almost entirely in the urine; other barbiturates, only a small per cent. Only eight per cent of, for example, iso-amylethyl barbituric acid (amytal) is excreted in the urine; of certain other compounds only one per cent. Fowls and turtles excrete very small quantities of barbital in the urine, and they are very susceptible to its effects. They do not recover from anesthetic doses, but die of respiratory failure. Fowls may retain the drug in the tissues seventeen days after a single dose; turtles may retain it eighty days. Anesthesia is not unduly prolonged in these species after administration of closely related barbital compounds such as phenobarbital, and others which were studied.

After kidney injury, dogs, cats, and rabbits, which normally excrete barbital in the urine, never recover from barbital depression. They remain anesthetized till death and retain the drug in the tissues. Recovery from other compounds studied occurred in these species in the presence of nephrosis.

The Georgetown workers conclude that barbital (diethylbarbituric acid, veronal) in large doses is dangerous to individuals with deficient

1. New and Nonofficial Remedies, 1933. Chicago: American Medical Association, 1933.

2. Murphy, W. S.; and Koppanyi, Theodore: Studies on the Barbiturates. Jour. Pharm. & Exper. Ther., **52**:70, Sept., 1934. Koppanyi, T.; Murphy, W. S.; and Gray, P. L.: Action of Barbiturates in Sauropsidae. Idem, p. 78. Koppanyi, T.; and Krop, S.: Elimination of Iso-amylethylbarbituric Acid (Amytal) and Butylethylbarbituric Acid (Neonal). Idem, p. 87. Koppanyi, T.; and Dille, J. M.: Experimental Analysis of Barbital Action. Idem, p. 91.

kidney function; and conversely, decreased barbital excretion means kidney damage.

Immunization Against Tetanus.—The most unpleasant part of the treatment of a nail in the foot or of many of the mild penetrating wounds of civilian life, is the injection of tetanus antitoxin, which at times provides more discomfort than the original injury. The immunity provided by the injection is passive, and brief, and antitoxin must be reinjected after later injuries. So well is the public educated, however, to the dangers of "lockjaw" that it eagerly submits to the injection or asks for it.

Diphtheria toxoid, a formalin treated diphtheria toxin, has been accepted as an immunizing agent to replace toxin-antitoxin.[1] A tetanus toxoid has long been studied; however, apparently it did not produce the desired immunizing effects. Bergey[2] describes a new technic of preparation and use of tetanus toxoid. He employs an alum precipitated tetanus toxoid, prepared by the method used successfully by Wells, Graham, and Havens[3] for diphtheria toxoid. By administering it to guinea pigs he produced a high degree of immunity to tetanus. He also injected it into human beings and studied the immune reactions of their sera. He detected a high concentration of tetanus antibodies, after two and three doses given at long intervals. The immunity develops slowly, but is lasting, according to his reports.

The convenience of injecting a serum-free product and of active instead of passive immunization, is obvious. If confirmed by more extensive studies, this method of tetanus immunization will be a valuable prophylactic measure.

Pellagra and Black Tongue.—The degeneration of the nervous system in late pellagra and in late pernicious anemia is among the most serious and irremediable of the clinical manifestations of these diseases. Zimmerman, Cowgill, Bunnell and Dann[4] have attempted to throw light upon the nerve changes in pellagra by investigating again the much studied problem of dietary etiology.

Goldberger originally produced black tongue in dogs on a diet deficient in what he called the "pellagra preventive" factor, pp; he considered the experimental disease identical with human pellagra. In modern parlance the "pellagra preventive" factor is usually identified with vitamin G. According to the Yale workers,[4] Goldberger's diet for experimental black tongue is quite unsatisfactory as a G-deficient diet. When they administered a modern G-deficient diet to dogs, they produced, not black tongue, but a condition much more closely resembling human pellagra. Particularly the nerve changes in this condition resembled those of pellagra. There was a progressive demyelinization of the peripheral nerves and of those of the spinal cord, which did not occur in dogs with black tongue.

They believe that they have thus, by omitting vitamin G from the diet, induced in dogs a condition more closely resembling human pellagra than Goldberger was able to obtain by eliminating the "pellagra preventive" factor from his diets. In their G-deficient animals the nerve changes resembled those of late pellagra.

1. Walker, Alfred A.: One Dose Alum Toxoid in Diphtheria Immunization. J.A.M.A., **103**:227, July 28, 1934.

2. Bergey, D. H.: Active Immunization Against Tetanus Infection with Tetanus Toxoid. Jour. Inf. Dis., **55**:72, Aug., 1934.

3. Wells, D. M.; Graham, R. H.; and Havens, L. C.: Diphtheria Toxoid Precipitated with Alum; Its Preparation and Advantages. Amer. Jour. Pub. Health, **22**:648, 1932.

4. Zimmerman, H. M.; Cowgill, G. R.; Bunnell, W. W.; and Dann, Margaret: Studies on the Nervous System in Deficiency Diseases: Experimental Black Tongue. Amer. Jour. Physiol., **109**:440, Sept., 1934.

TWENTY-FIVE YEARS AGO

FROM JOURNALS OF 1909

Intravenous Local Anesthesia.[5]—"The extremity to be operated on is carefully bandaged. * * * Under infiltration anesthesia a subcutaneous vein close to the upper bandage is exposed, if possible by a vertical incision. * * * The vein is freed, two ligatures are passed beneath it, the upper ligature tied, and the vein cut across. An ordinary metal infusion cannula is then passed into the lower (distal) end of the vein and tied over it, firmly closing the vein about the cannula. Through this cannula the operator injects from 50 to 100 c. c. of 0.5 per cent novocaine solution in a direction opposite to the normal blood current. Anesthesia results in from five to ten minutes, due to the passage of the novocaine solution through the vein wall, and is complete. The cannula is left *in situ.* * * * When the operation is completed and before closing the wound, the vein is washed out with warm salt solution."

Pancreatitis and Gallstones.[6]—"Pancreatitis * * * can be diagnosed without difficulty; it is in the great majority of instances secondary to and dependent upon cholelithiasis or infection of the biliary tract; * * * its presence having

5. Hitzrot, James Morley: Intravenous Local Anesthesia. Ann. Surg., **50**:782, 1909.

6. Smith, Charles N.: Surgical Aspects of Pancreatitis. Idem. p. 736.

been demonstrated, removal of its cause is imperative; * * * sodium phosphate, olive oil, neglect, delay and optimistic indifference in the treatment of gallstones must give way to prompt radical and efficient surgical intervention."

Silver Foil in Surgery.[1]—"It is a repetition, but surely not a vain one, to assert the value of silver foil as a dressing. Halsted * * * introduced it into the wards of the Johns Hopkins Hospital in 1895. Since then the use of silver foil dressing has been propagated largely by such as have seen it used in Baltimore."

Simplicity in Operations for Appendicitis.[2]—"The surgical treatment of appendicitis was developed on the basis of the older teaching; it was believed that the intestines should be walled back by gauze pads, that the entire appendical area should be removed. * * *

"The question of appendix removal [in operations for appendicitis] is an important one."

1. Levin, J. S.: Note on Silver Foil in Surgery. Idem, p. 793.
2. Dowd, C. N.: The Advantage of Simplicity in Operations for Appendicitis. Idem, p. 762.

San Antonio, Where We Meet

HUNTING AND FISHING IN AND ABOUT SAN ANTONIO*

San Antonio is a metropolitan city of over a quarter of a million inhabitants with all the business life and amusements found in other cities of like size. It has five 18-hole and one 9-hole golf course on which play is enjoyed approximately 360 days out of the year. Municipally owned playgrounds in every section of the city abound with tennis courts and facilities for other outdoor sports. Yet, within a radius of 100 miles, the country abounds with wild life of all kinds. More deer are killed in this territory than in any part of the state. Fifteen miles away from the city, in a north to northwest direction known as the Wetmore Country, deer are so plentiful that any evening hundreds may be counted grazing in the occasional fields. Landowners have given up the business of farming and make the leasing of their lands for hunting purposes their chief source of revenue.

The hunting season for ducks is from November 16 through December 31.

The Wetmore Country is made up of cedar woods and low, rolling hills. Westward, 30 to 100 miles, is what is known as the hill country, with massive rocky hills and thick, almost unpenetrable cedars. Here considerable hunting art is required to bag a deer. There is no lack of antlered game even in this section. In Kerrville, the hill country metropolis, just 27 miles from the Alamo City, hundreds of bucks are killed during the season.

A different species of deer, larger and darker in color, inhabits the flat mesquite country, which extends southward from San Antonio to the Mexican border. Many believe that these deer, which carry massive horns referred to as "rocking chairs," are an interbreed of the Louisiana variety and the New Mexico black tail. There are few men in the medical profession in San Antonio who have not one of these antlered trophies on the walls of their offices or dens.

America's biggest game bird, the bronze turkey gobbler, thrives in this part of Texas. The limit each season is three gobblers per hunter and the seasons run concurrently with that of deer.

A successful hunt in Texas.

Another type of animal which does not come under the game qualifications, since it is unprotected, is the Mexican lion, known as the mountain lion, cat or panther. These are usually hunted on horseback behind big packs of fierce dogs. In certain mesquite lands, near Encinal, Reagan Wells and Cattarina, only 90 miles from San Antonio, the Government has established predatory animal hunters to run down this menace to sheep and cattle owners.

Many physicians in San Antonio have taken up wolf hunting. Javelina, a certain type of wild hog, bob cats, ocelots, rabbits, squirrels and other beasts also fall before the sportsman's rifle.

For the more venturesome, it is easy to arrange a trip to Mexico. Only 150 miles away is the entrance to the southern republic, Laredo, from which point a party can proceed only 60 or 70 miles into the interior in any direction and be in the midst of the finest tropical game hunting in the North American country. The State of Texas and even Mexico are kind to the visiting sportsmen and a comparatively insignificant non resident hunting license is required. Quail shooting is second to none in the Southern states. If bob white shooting becomes too tame, a more tricky art is to shoot the Mexican blue quail, which seldom fly, but run in swift jerks through the brush. These are plentiful in the border country. The open season

*Prepared by Mr. Fred Maly, San Antonio, formerly sports writer on the San Antonio Evening News, for Dr. P. I. Nixon, Chairman of Publicity for the Southern Medical Association's San Antonio meeting.

is from December 1 to January 16. The Mexican white wing dove and the American mourning dove are found in great numbers.

The Texas Gulf Coast is second to none for its water fowl shooting. Conveniently situated clubs all along the coast from Aransas Pass to Brownsville invite the visit of the duck shooters.

Bass fishing is excellent in Medina and McQueeney Lakes. There is good fishing in the hundreds of rivers, streams and creek which wind through this vast region. Fresh water angling is favored by Texans, but Gulf Coast fishing is very good. Tarpon, mackerel, big king and jack fish, trout and red fish are to be caught.

The San Antonio hosts to the Southern Medical convention are eager to have their visitors spend a few days, after business meetings are over, in enjoying the outdoor sports in and around San Antonio. Any member who desires to make arrangements for hunting or fishing trips should communicate early with Dr. Roy T. Goodwin, Vice-Chairman of the Convention's Arrangement Committee, Alamo National Building, San Antoniio, so that proper arrangements can be made for such trips and outings as he may desire.

After San Antonio, Mexico

MEDICAL TRAINING IN MEXICO: SOME HIGHLIGHTS IN ITS HISTORY*

On October 23, 1933, the School of Medicine of the National University of Mexico entered the second century of a most active and useful life. * * *

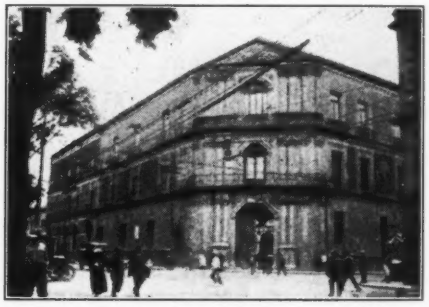
The history of medicine in Mexico is as rich and colorful as the general history of the country. * * * Mexico's medical record is long and enviable. The Aztecs had at their command more than three thousand medicinal plants; in fact, they knew more about certain aspects of medicine than did the Spaniards who conquered them. Mexico City gave us the first medical book published in America; the first course in medicine in an American university; the first Academy of Medicine in Latin America; and the first American periodical of a medical character.

In the time of the Aztecs, medicine was an hereditary profession, taught by physicians to their sons after these had received, from the priests and tutors, an elementary education in the schools and seminaries attached to the temples. Medical instruction included the study of pathology, therapeutics, botany, and pharmacy, followed by clinical training. In order to practice, it was necessary to pass an examination and to obtain a license from the authorities.

Medicine must have reached a high degree of development among the Aztecs. One of the early Spanish historians tells us that "they had great knowledge of vegetable products, knew how to bleed and how to rub, reduced dislocations and fractures, scarified and cured sores and gout, and cut the carnosities in cases of ophthalmia." Medicinal herbs were sold in the streets of Tenochtitlan, the Aztec metropolis, and extensively cultivated in the royal botanical gardens. The city had hospitals for the aged and the poor, as well as homes for civil and military servants of the crown who had become disabled and required assistance.

It was not long after the Spaniards conquered the Aztecs, destroyed their social and political institutions, and initiated a new order, that educational institutions of diverse kinds began to appear. In 1525, four years after the great Tenochtitlan was destroyed and Mexico City commenced to rise in its place, the Town Council agreed to pay Francisco Soto, a barber-surgeon, a salary for his services as instructor in his profession.

According to some historians, medical instruction in an institution was first given in the College of Santa Cruz de Tlatelolco, an educational establishment which ranked high in those days, specially during the time of the illustrious viceroy don Antonio de Mendoza. Formal professional studies began in 1580 with the establishment of a course in medicine at the Royal and Pontifical University which had been founded in Mexico City in 1553. Later on three other courses were added, the four constituting the professional instruction given until the end of what is known as the metaphysical period of medical science. Other centers of medical training during this period were the University of Guadalajara and the Royal School of Surgery in Mexico City, both of which were founded after the University of Mexico City had begun its courses in medicine.



School of Medicine, National University of Mexico.

In 1570, the first medical book to be published in the New World, the *Opera Medicinalia* of Francisco Bravo,

*By Mr. Adam Carter, Pan American Union Staff, Washington, District of Columbia.

*Reprinted by permission from *Modern Mexico*, volume 4, number 47 (December 1933), pages 18-20. *Modern Medicine* is a monthly journal published under the auspices of the Mexican Chamber of Commerce of the United States, New York.

AFTER SAN ANTONIO, MEXICO. The Secretary-Manager of the Southern Medical Association announces an official, personally conducted, tour to Old Mexico following the San Antonio meeting. The School of Medicine, National University of Mexico, mentioned on this page will be one of the points of interest to be visited on the tour. Any one interested should ask the Association office for the special folder giving a full description of the tour. Address Southern Medical Association, Empire Building, Birmingham, Alabama.

appeared in Mexico City, and was followed in 1578 by the Summa y Recopilacion de Chirugia, written by Alfonzo Lopez de Hinojoso. As the authors of these two books were Spaniards, the publication in 1579 of the Tratado Breve de Medicina written by Friar Agustin Farfan, a Mexican and one of the first medical graduates from the University, may be considered an even greater honor for Mexico.

These books constitute an implied tribute to the Indians, because it was, in a large measure, the knowledge acquired from them that gave the authors the information there published.

The first medical academy in Latin America was established in Mexico City in 1732, and the first medical periodical in the New World, the *Mercurio Volante,* founded there in 1772. It is true that this institution and the publication were short-lived, but the fact that they found obstacles which proved, in the end, insurmountable, serves only to emphasize the progressive spirit of the men who established them. Prior to the appearance of the *Mercurio Volante,* medical writings had appeared in the *Gaceta de Mexico* (1722-42). A list has been compiled which mentions 315 medical works published in Mexico City from 1570 to 1833.

The road of medical progress was not an easy one during those centuries. Medicine and surgery were two separate professions, and physicians and surgeons, especially the latter, did not enjoy the social standing to which they were certainly entitled.

Medicine itself was subdivided into several professions, and the training given those who embraced any one of these was limited. Besides, medical and theological knowledge were so interwoven that it was hard to say where one ended and the other began. Anatomy was more advanced under the Aztecs than in Colonial days, and while it is true that the proficiency of the former was acquired because human sacrifices were made to the gods, the fact remains that this superior knowledge existed. The Christian world in those days did not approve of the dissection of the human corpse. Charles V inquired of the doctors in the University if it was a mortal sin to perform such an operation, and Philip II forbade all dissections.

An incident that occurred in 1692 may serve to illustrate the great importance attached in those days to the opinions expressed in regard to corporeal matters by those who ministered to the needs of the soul. The viceroy had forbidden the use of pulque (a beverage made from the agave plant) by the Indians, and in order to ascertain if this measure was just and advisable, he consulted not only the Royal Board of Physicians but also the University and the Jesuit Fathers. The decision of the Royal Board was brief, and of a scientific, if somewhat arbitrary, character. The Jesuits expressed their opinion in a strictly theological document. And the University submitted a lengthy report in which appeared the names of Juno, Herodotus, Saint Thomas, Saint Augustine, Saint John Chrysostom, and many others equally impressive.

A knowledge of the disadvantages under which medicine labored in those days makes for a better appreciation of some events that took place during the Eighteenth Century, such as the request made of the king in 1735, upon the initiative of a medical academy then established in Mexico City and in the name of all Mexican physicians, that an independent medical school be established in the country—a praiseworthy, if fruitless, suggestion; the beginning of dissections at the School of Surgery; the order issued by Charles III in 1787 that medicine be accorded the same regard and respect as the other learned professions because "it has the noble status of a science;" the recognition by the authorities of the highly useful character of medical services in an order issued in 1793 whereby physicians were requested to answer with promptitude all calls for their assistance; and the intense persecution of charlatans in the latter part of the century. It may be of interest to note that many of these illegal practitioners were turned over to the Tribunal of the Inquisition, then housed in a building which is now the seat of the School of Medicine.

In spite of existing difficulties, really valuable work was performed by the men of this period; they inaugurated the era which produced the Medical School.

The line of cleavage between what may be termed the official and the liberal viewpoints in educational matters became even more accentuated in the beginning of the Nineteenth Century. At that time it was not permissible to teach outside the University; this fact led Dr. Jose Luis Montana, an eminent physician, to establish, in secret, medical courses in which theoretical knowledge was acquired, to be completed later on by clinical experience in the various hospitals.

At the close of the Wars of Independence (1810-21) the new era in medicine began to flourish. Many textbooks and instruments arrived from Europe, and dissections became frequent. In 1832 the Government ordered that surgeons be accorded the same privileges as physicians; in 1830 the union of medical and surgical studies was established; and 1931 saw the abolition of the Board of Physicians, which for more than two centuries had directed the study and the practice of medicine, and which had reached a state of decadence. The board was replaced by a Medical Faculty in charge of examinations. These events culminated in the creation of an Establishment of Medical Sciences, which later on became the National Medical School. The new institution was created by a decree of October 23, 1833, and opened its doors on the 28th of the following month.

At that time a doctor of medicine, don Valentin Gomez Farias, was Acting President of Mexico. This great statesman, called today, in all justice, the Father of the Liberal Revolution, took a personal interest in the advancement of medical training, and it was due to his efforts that the new school was established. The achievements of Gomez Farias, one of the men of whom Mexico is justly proud, are enhanced by the fact that he worked under the most adverse conditions, in times of pestilence and war. In 1833 an epidemic of cholera morbus struck Mexico City, and the people saw their President, who did not forget that he was a physician, employ the hours that his official duties left him free in going from house to house, in the poorer sections of the city, giving medical assistance to the destitute.

The building in which the School of Medicine is now established was at first a Dominican convent, and later occupied by the Inquisition for more than two centuries. The cloister-like corridors of this imposing old place and the broken flagstones of its enclosed courtyards, now trod by men of science deeply concerned with the ills to which the human flesh is heir and by students possibly awed at the prospect of examinations, were formerly paced by grim-faced priests bent on saving the human soul no matter what the price the human body had to pay. After the Inquisition was abolished, the

building was used as a state prison; a gambling place; an army barracks; the seat of Congress; the seat of the Government of the State of Mexico; the War Office; and a secondary school. In 1845 it was acquired by the Medical School, which has occupied it ever since.

The School of Medicine has not always had easy sailing, and there is certainly a great deal of merit in its having reached the first centenary of an active and useful life. It opened with 84 students. Now it has more than twenty times that many. The salaries first paid the faculty were quite satisfactory, considering the times and the economic situation of the country. Each professor received 1,200 pesos a year.

Politics have on several occasions crossed the path of the school. In 1835, as a result of a change in government, the faculty was compelled to vacate the building it was using, but this only served to give the professors a chance to show their mettle. They continued to give instruction in their homes and at various hospitals placed at their disposal by other physicians. Incidents of a similar nature have occurred at various times, but have always been overcome by the energy and the disinterestedness of those in charge of the school.

During the war of 1847 a complete company, officers and men, was formed by the faculty and students and made part of the "Hidalgo" regiment. In 1863 a protest was made by the school against the French intervention begun the previous year, and allegiance sworn to the national government. This was done in a moment of real danger, because the invaders were then not far from the city. In 1862 the school had contributed, with the sums intended for its prizes, to the maintenance of military hospitals, and all its professors and students had offered their professional services to the government.

The School of Medicine, now a part of the National University, has a brilliant record of achievement. It constitutes, as has been said, the center of Mexican medical training, which need not fear comparison with schools of other nations. The scientific work of many of its graduates does honor to the country and to the institution, and on the other hand, these men may well be proud of having such an alma mater.

Book Reviews

External Diseases of the Eye. By Donald T. Atkinson, M.D., Consulting Ophthalmologist to the Santa Rosa Infirmary and the Nix Hospital, San Antonio, Texas; Fellow of the American Academy of Ophthalmology and Otolaryngology; Life member of the American Medical Association of Vienna. 704 pages, illustrated with 479 engravings. Philadelphia, Pennsylvania: Lea & Febiger, 1934. Cloth, $7.50.

This book is written for the tentative diagnosis of ophthalmic conditions in the anterior segment of the eye, because these conditions are more frequently seen and can be diagnosed without expensive instruments. This should strongly commend the volume to the general practitioner and student, as well as to the ophthalmologist, who will find here an easy reference to this group of diseases. It is logically divided into fifteen chapters. Each subject is exhaustively treated without sacrifice of readability or clarity.

The first chapter gives a brief, comprehensive resumé of ophthalmic history from early Egyptian ophthalmology up to the invention of the ophthalmoscope by von Helmholtz in 1851. Succeeding chapters discuss in detail the affections of the eyelids, the lacrimal apparatus, the orbit, the conjunctiva, the cornea, the sclera, iris, ciliary body, glaucoma, crystalline lens, external muscles of the eye, hygiene of the eyes, history taking and case records and remedies used in treatment of external diseases of the eye. Each chapter contains numerous references to the current literature on the subject. The chapters on muscle imbalance and on hygiene of the eyes should commend themselves to the "family doctor" and pediatricians. The section treating of the relationship between the eye and intranasal and systemic diseases brings out considerations important to the general practitioner as well as the ophthalmologist. Even the most casual reader will be impressed by the numerous excellent illustrations, the clearness of the type and the quality of the paper. The author is to be congratulated on his accomplishment.

Alcohol: Its Effects on Man. By Haven Emerson, M.D., Professor of Public Health Practice, Columbia University; Editor of "Alcohol and Man." 114 pages. New York: D. Appleton-Century Company, 1934. Cloth, $1.00.

"Alcohol: Its Effects on Man," is intended as "a textbook for high school and college students and to provide school teachers with scientific data regarding the effects of alcohol on man." In its hundred pages it makes available to the mature adult much important information to use as a personal guide as to whether or not he or she should drink alcoholic beverages. Alcohol is described as "a narcotic" that "impairs reason, will, self-control, judgment, physical skill and endurance."

While giving facts, it leaves much to the judgment of the reader. The author's attempt in chapter XV to outline "conditions for a permissible use of alcoholic beverages," all of which contain a habit-forming drug, seems unwise and dangerous in a book intended for high school boys and girls. In spite of its shortcomings as a text-book for high school and college students, Emerson's is perhaps the best book available for the use of teachers in instructing their pupils regarding the effects of alcohol upon the human body.

Tuberculosis in the Child and Adult. By Francis Marion Pottenger, A.M., M.D., LL.D., F.A.C.P., Clinical Professor of Medicine (Department of Chest), University of Southern California, the School of Medicine; Medical Director, the Pottenger Sanatorium and Clinic for Diseases of the Chest, Monrovia, California. 611 pages, illustrated. St. Louis: The C. V. Mosby Company, 1934. Cloth, $8.50.

This is a comprehensive work written by one who has specialized in this field of medicine for many years.

The author has given more than the usual attention to childhood infection and its relationship to tuberculosis in the adult. He describes the points of difference in the reaction of the tissues to primary infection as seen usually in infancy or early childhood, and to reinfection which represents the adult type of tuberculosis.

Diagnosis is thoroughly discussed, especial attention being given to inspection and palpation, and the use of tuberculin. The book is profusely illustrated with x-ray photographs showing the various types of lesions and the changes which they undergo with the lapse of time. The ideal treatment is described with its various modifications to meet special conditions. Many case histories are cited in detail to illustrate this part of the work.

The Care and Feeding of Children. By L. Emmett Holt, Jr., M. D., Associate Pediatrician to the Johns Hopkins Hospital, Baltimore, Maryland. 259 pages. Brooklyn, New York: D. Appleton-Century Company, 1934. Cloth, $1.25.

This is the fifteenth edition of the catechism originally written for mothers by Dr. L. Emmett Holt, Sr., more than thirty years ago. L. Emmett Holt, Jr., has revised the work in many particulars, especially as regards feeding of the infant and growing child. The directions for preparing foods are especially good. The information given throughout the book is abreast with the times and presented in simple language easily understood by the average mother.

Obstetric Medicine. The Diagnosis and Management of the Commoner Diseases in Relation to Pregnancy. Edited by Fred L. Adair, M.A., M.D., F.A.C.S.; Mary Campau Ryerson, Professor of Obstetrics and Gynecology, University of Chicago; and Edward J. Stieglitz, M.S., M.D., F.A.C.P.; Assistant Clinical Professor of Medicine, Rush Medical College of the University of Chicago. 743 pages, illustrated. Philadelphia: Lea & Febiger, 1934. Cloth, $8.00.

This is an outstanding and unique contribution to obstetric literature. Unlike the usual text-book that deals with the germain principles of a science, this volume presents in a practical and interesting manner the collateral medical problems of obstetrics. The subject matter is presented with clarity and an elasticity in conclusions that renders the text free from dogmatic interpretation. Well-known authorities, on various medical conditions, are included among the list of contributors, a plan that arrests attention and adds to the effectiveness of reference.

The chapter on "Physical Diagnosis in Pregnancy" is of immense assistance to the obstetrician, and in itself would justify the edition. Of special interest are the chapters on "Tuberculosis," "Anemia," "Deficiency Diseases," "Diseases of the Circulatory System," "Diseases of the Alimentary Tract," "Orthopedic Diseases" and "Diseases of the Endocrine Glands."

"Obstetric Medicine" is a departure in medical literature that is refreshing for its newness and as a classical source of information.

The Merck Manual of Therapeutics and Materia Medica. A Source of Ready Reference for the Physician. 1379 pages. Rahway, New Jersey: Merck & Co., 1934. Cloth, $2.00.

This manual provides an efficient reminder to the physician of the little used and the unusual prescriptions that he at times needs in caring for his patients. The following new subjects have been added: acidosis, food poisoning, botulism, infantile convulsions, myasthenia gravis and tularemia.

Clinical Miscellany. The Mary Imogene Bassett Hospital, Cooperstown, New York. Volume I, 1934. Contributed to by Floyd J. Atwell, M.D.; C. Lee Buston, M.D.; Francis F. Harrison, M.D.; Monroe A. McIver, M.D.; Charles C. McCoy, M.D.; G. M. Mackenzie, M.D.; Marjorie F. Murray, M.D.; Robert M. Pike, Ph.D.; John H. Powers, M.D.; T. J. Abernethy, M.D. 206 pages, illustrated. Springfield, Illinois: Charles C. Thomas, 1934. Cloth, $3.00.

"Clinical Miscellany" is a volume recording the interesting cases and symptoms observed by staff members of the Imogene Bassett Hospital. Among the cases discussed are chronic meningococcemia, six cases of undulant fever, *Shigella alkalescens* pyelitis sulphemoglobinemia and a number of others in which the symptoms differ from those ordinarily expected. The selection of cases, presentation and comments are worthy the attention of the profession at large.

A Text-Book of Neuropathology. By Arthur Weil, M.D., Associate Professor of Neuropathology, Northwestern University Medical School, Chicago, Illinois. 335 pages, illustrated with 260 engravings. Philadelphia: Lea & Febiger, 1933. Cloth, $5.00.

Several excellent text-books on neuropathology have appeared recently. This is one of the best. The illustrations are numerous and to the point.

A comparatively large amount of space is given to the subject of syphilis of the central nervous system. This alone would make it an excellent book for the average clinician. The appendix gives a valuable discussion of the staining methods used for preparation of the illustrations.

A complete bibliography appears after the appendix.

Southern Medical News

ALABAMA

Dr. James N. Baker, Montgomery, State Health Officer, has been appointed to succeed Dr. Waller S. Leathers, Dean of Vanderbilt University School of Medicine, Nashville, as a member of the National Board of Medical Examiners for a term of six years.

Dr. James S. McLester, Birmingham, President-Elect of the American Medical Association, made an address before a recent meeting of the Birmingham Kiwanis Club.

Dr. Miles A. Copeland, Birmingham, announces the removal of his offices to the Lyric Theater Building.

DEATHS

Dr. Charles H. Drake, Birmingham, aged 58, died in August.

Dr. Clarence Joseph Pullen, Georgiana, aged 60, died July 15.

Dr. William Praytor Cooke, Odenville, aged 56, died June 10 of injuries received in an automobile accident.

Dr. John W. Williams, Harvest, aged 76, died May 12 of hypostatic pneumonia.

ARKANSAS

The Staffs of the Leo N. Levi Memorial Hospital and the Charles Steinberg Clinic, Hot Springs, will hold their fourth Clinical Conference on October 11. Dr. George R. Livermore, Memphis, Tennessee, will be the guest speaker for the occasion, presenting his subject at the informal dinner on the evening of the 11th.

Dr. and Mrs. William Johnson, Hardy, were hosts for the meeting in July of the Lawrence County Medical Society and the

Auxiliary, serving a barbecue supper following the scientific program.

The Washington and Benton County Medical Societies met in July for their annual picnic session. Dr. H. D. Wood, Fayetteville, the only living charter member of the Washington County Medical Society, gave the anniversary address on the occasion of the sixty-second anniversary of his county society.

The Saline County Medical Society recently sponsored a tonsil clinic and also a tuberculosis diagnostic clinic.

Dr. Irving J. Spitzberg, Little Rock, was awarded Fellowship in the Academy of Pediatrics at their convocation at Cleveland.

Dr. Sam G. Daniel, Marshall, is the newly appointed Chairman of the Farm Debt Adjustment Committee for Searcy County.

Dr. Thomas C. Watson, Benton, has been made President of the Benton Rotary Club.

Dr. A. M. Gibbs, Hamburg, Director of the Ashley County Health Unit, recently took a special course in public health work, which included a traveling fellowship for the study of public health work in Kentucky and Tennessee.

Dr. J. Donald Hayes and Dr. J. Harry Hayes, Little Rock, announce the opening of their offices in the Donaghey Building for a partnership practice.

Dr. Charles Wallis, Little Rock, has opened offices in the Donaghey Building for the practice of pediatrics.

Dr. E. A. Buckley, Bauxite, has been taking postgraduate work at Tulane University, New Orleans, Louisiana.

Dr. Gordon Hastings, Assistant State Health Officer, Little Rock, has begun a year's advanced study in public health work, having been awarded a fellowship for this work by the Rockefeller Foundation.

Dr. E. T. Brown has moved to Marvell from Lexa.

Dr. Ruth Ellis, Fayetteville, has completed her internship and become associated with her father at Fayetteville in the practice of medicine.

Dr. Fontaine R. Richardson, Fayetteville, and Miss Elizabeth Haney Porter were married in June.

Dr. Hardy H. Smith, Jr., Fort Smith, and Mrs. Eva Jay Ives Armstrong were married in June.

DEATHS

Dr. James Vance Ferguson, El Dorado, aged 33, died July 8 of complications following perforation of an ulcer of the stomach.

Dr. David A. Hutchinson, Nashville, aged 85, died May 27 of senility.

Dr. Louis M. Crow, Des Arc, aged 53, died June 10 of cerebral hemorrhage.

Dr. Othello Morino Bourland, Van Buren, aged 75, died June 28 of coronary thrombosis.

Dr. Benjamin F. Tarver, Star City, aged 70, died June 20 of cerebral hemorrhage.

DISTRICT OF COLUMBIA

The Washington Ophthalmic Society, whose membership is open to physicians of Maryland, Virginia, West Virginia and North Carolina, as well as Washington, was organized recently with the following officers elected for the coming year: Dr. William Thornwall Davis, Chairman; Dr. Le Roy W. Hyde, Vice-Chairman; and Dr. James N. Greear, Jr., Secretary; all of Washington.

Representatives of medical, dental and civic societies of Washington recently organized the District of Columbia Health and Hospital Council, this organization to act as a medium of ascertaining opinion and reaction of the majority in professional administrative and lay organizations representing the citizens.

Dr. James T. Jackson, formerly of Ashburn, Virginia, has come to Washington as Chief Resident in Surgery at Garfield Memorial Hospital.

Dr. Ralph L. Lawson, Washington, was recently promoted and commissioned as a surgeon in the regular corps of the United States Public Health Service.

DEATHS

Dr. Louis Albert Ivey, Washington, aged 39, died June 21 in an automobile accident.

Dr. Joseph Gaston Baillie Bulloch, Washington, aged 82, died July 4 of arteriosclerosis.

FLORIDA

Dr. Jack Halton, Tampa, has been in Cincinnati doing work in proctology at the Cincinnati University Hospital, Christ's Hospital, the Good Samaritan Hospital and the Jewish Hospital.

Dr. H. L. Brillhart, Jacksonville, has been attending clinics in Baltimore.

Dr. Shaler Richardson, Jacksonville, recently attended medical meetings in New York and Canada.

Dr. N. P. Myers has moved from Parrish to Holopaw to practice.

Dr. John S. Helms, Jr., Tampa, is attending clinics in surgery at the Mayo Clinic, Rochester, Minnesota.

Dr. W. H. Spiers, Orlando, recently attended a postgraduate psychiatric clinic in Chicago.

Dr. Courtland D. Whitaker has moved from Raiford to Marianna, where he has opened offices in the Dekle Building.

Dr. F. W. Chappell has moved from Hastings to Madison, where he will operate the Yates Sanatorium.

Dr. S. B. Forbes, Tampa, recently took postgraduate work in ophthalmology and otolaryngology in Denver.

DEATHS

Dr. Harry Lyman Putnam, St. Petersburg, aged 70, died July 27 in a hospital at Asheville, North Carolina.

GEORGIA

The Chattahoochee Valley Medical and Surgical Association, which held its annual meeting at Radium Springs, Albany, Georgia, in July, elected the following officers for the coming year: Dr. Charles C. Harrold, Macon, Georgia, President; Dr. Marion T. Davidson, Birmingham, Alabama, First Vice-President; Dr. Matthew J. Flipse, Miami, Florida, Second Vice-President; and Dr. W. J. Love, Opelika, Alabama, reelected Secretary-Treasurer.

Dr. L. Sage Hardin, Atlanta, was given a surprise party on his birthday recently, at which time a refinished and refurnished room at the Georgia Baptist Hospital, where the party was held, was formally opened. The door to the room bears a bronze tablet commemorating the event.

Dr. W. C. Hafford, Waycross, was host recently to members of the Ware County Medical Society.

Dr. R. B. Gilbert, Greenville, was host at a dinner recently to members of the Meriwether County Medical Society.

Dr. Kenneth S. Hunt, Griffin, now has associated with him in the practice of internal medicine Dr. George L. Walker.

Dr. and Mrs. M. A. Fort, Bainbridge, recently entertained members of the Decatur-Seminole Counties Medical Society at their home.

Dr. R. Hugh Wood, Atlanta, has moved into new offices in the Doctors Building.

Dr. O. B. Murray has moved from Chickamauga to Rossville to practice.

Dr. and Mrs. R. L. Johnson Waycross, were hosts to members of the Ware County Medical Society for dinner, followed by a business and scientific session.

The University of Georgia School of Medicine faculty members, Augusta, recently gave a series of lectures in Sandersville, this being part of an extension course sponsored by Emory University and the University of Georgia under the supervision of the State Board of Health.

Dr. William E. Mitchell, Atlanta, and Mrs. Helen Crockett were married in June.

DEATHS

Dr. John Calhoun Griffies, Burwell, aged 74, died July 26.

Dr. Hamlin Collier Cook, Cedartown, aged 75, died July 4.

Dr. Harvard Smith, Smithville, aged 74, died July 12.

Dr. Frank Mulford Hill, Eastman, aged 49, died April 25.

Dr. Theodore M. Lee, Murrayville, aged 54, died March 5 of carcinoma of the throat.

Dr. Miles D. Cunningham, Decatur, aged 61, died July 13 of heart disease.

KENTUCKY

The State Board of Health, under a reorganization bill passed by the last State Legislature, has been changed to the State Department of Health of Kentucky, and the State Health Officer will be known as the State Health Commissioner, to be elected by a Board of Health.

Dr. Robert K. Galloway, Henderson, formerly Director of the Henderson County Health Department, is the newly appointed Assistant to the Director of County Health Work of the State Board of Health.

Dr. Edward T. Thompson is the newly appointed Superintendent of Norton Memorial Infirmary, Louisville, Dr. Thompson coming from the Indiana University School of Medicine at Indianoplis.

The McLean County Medical Society, at its recent annual meeting, elected the following officers for the coming year: Dr. O. V. Brown, Island, President; and Dr. G. L. Thompson, Calhoun, Secretary

Continued on page 24

DIET
THE PRINCIPAL RESOURCE
in the
TREATMENT
of
OBESITY

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1. **Rigid control of intake of food.**
2. **Foods adequate in protein, salts and VITAMINES.**

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Dr. Russell M. Wilder *(International Clinics, December 1933)* **says in emphasizing the above points regarding the diet used in the treatment of obesity, "It requires as careful planning and as much accuracy in serving as that necessary for diabetes."**

He Says: "We have used a yeast vitamin tablet for vitamin B instead of the actively growing yeast, - - -"

"The yeast tablets* contain extract of yeast vitamins. Six tablets a day has been considered sufficient for these purposes.
**Prepared by the Harris Laboratories, Inc., of Tuckahoe, N. Y."*

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BREWERS' YEAST-HARRIS
is available; A uniform product, used by the U.S.P.H. Service and experimental laboratories. Standardized for Vitamine-B. Will not ferment in the stomach.

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TESTED STANDARDS

Continued from page 890

DEATHS

Dr. Taylor Hurst, Hazard, aged 54, died July 5 of carcinoma of the transverse colon.

Dr. Leon M. Prichard, Catlettsburg, aged 61, died May 17 of chronic myocarditis.

Dr. Robert Benjamin Ginn, Frankfort, aged 62, died June 28 of hypernephroma of the right kidney.

Dr. Jacob Glahn, Owensboro, aged 74, died April 28.

Dr. Walter Fisk Boggess, Louisville, aged 71, died July 1 of heart disease.

Dr. Henry C. Walbeck, Jr., Louisville, aged 56, died June 1 of heart disease.

Dr. John Gilmore Owsley, Lily, aged 67, died June 23 of heart disease.

Dr. Benjamin Franklin Parrish, Midway, aged 68, died July 11 of heart disease.

Dr. Evan Ellis Owen, Louisville, aged 45, died July 20.

Dr. William T. Simrall, Mount Sterling, aged 92, died July 22 of heart disease.

Dr. Orville B. Yager, Glencoe, aged 92, died May 28.

LOUISIANA

The Second District Medical Society recently elected the following officers for the coming year: Dr. L. T. Donaldson, Hahnville, President; Dr. Etienne P. Feucht, Laplace, Vice-President; and Dr. Nicholas K. Edrington, Goodhope, Secretary-Treasurer.

The Vernon Parish Medical Society was recently revived and the following officers elected for the coming year: Dr. J. F. Smith, Leesville, President; Dr. W. T. Franklin, Anacoco, Vice-President; and Dr. D. O. Willis, Leesville, Secretary-Treasurer.

Dr. Daniel N. Silverman, New Orleans, was recently named Assistant Professor of Clinical Medicine, Tulane University School of Medicine.

Dr. Oscar Bethea, New Orleans, Professor of Medicine and Clinical Medicine, graduate and undergraduate schools of Tulane University College of Medicine, is the newly elected President of the American Therapeutic Society.

Dr. E. L. King, New Orleans, has moved into new offices in the Medical Arts Building.

DEATHS

Dr. George Benjamin Collier, New Orleans, aged 44, died July 9 of acute gastro-enteritis and acute nephritis.

Dr. Mark Cyrus Gaines, New Orleans, aged 50, died February 24 of cerebral hemorrhage.

Dr. Edwin Caldwell Simonton, Shreveport, aged 48, died July 31.

Dr. Sylvian Beer Wolff, Opelousas, aged 43, died June 13.

MARYLAND

Health activities and health problems in Anne Arundel County will be absorbed and handled entirely by the state and county health authorities, since the withdrawal of Johns Hopkins School of Hygiene and Public Health and the Rockefeller Foundation from participation in the Model Health Department in this County, and the discontinuance of the Model Health Unit. A Public Health District, instituted in 1932, will carry on activities of the discontinued Model Health Unit.

Dr. William Andrew Horsley Gantt and Miss Mary Gould Richardson, both of Baltimore, were married in June.

DEATHS

Dr. Francis William Hartley-Hellyer, Baltimore, aged 76, died May 23 of hypertensive cardiovascular disease.

MISSISSIPPI

Dr. Loren Wallin, Natchez, announces the opening of offices in the Dixon Building, with practice limited to the treatment of diseases of children.

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For strength and *durability* . . . .
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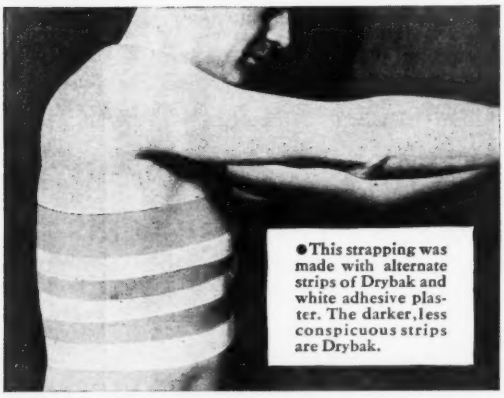
●This strapping was made with alternate strips of Drybak and white adhesive plaster. The darker, less conspicuous strips are Drybak.

● Drybak strappings give firm, steady support to weakened areas. The waterproof backcloth permits patients to bathe without impairing these Drybak qualities. Water cannot make the plaster soggy or separate the adhesive from the backcloth. The edges will not turn up. Drybak strappings come off cleaner, with less residue. Patients like the less conspicuous sun-tan color of Drybak. In standard widths and lengths, in cartridge spools, hospital spools, and in rolls, 5 yds. x 12", uncut. Order from your dealer.

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THE WATERPROOF ADHESIVE PLASTER

COSTS NO MORE THAN REGULAR ADHESIVE PLASTER

Radiograph showing dense band at growth end of radius.

PAINTED toys or furniture, leaded-rubber nipple shields, water pipes—these are a few of the more common sources of lead which make plumbism prevalent among infants and children. Yet, the easily recognized physical sign of the disease in adults—the dark "lead line" at the gum margins—rarely appears as an indication in these cases.

X-ray examination, however, provides definite proof of lead poisoning long before serious intoxication occurs. In children a dense band forms on the growing ends of long bones and at the margins of flat bones. This positive diagnostic sign can be revealed radiographically.

At the slightest suspicion of plumbism have the child patient radiographed. Your radiologist will give you definite proof of the disease, if present. Your treatment then may be instituted promptly. Paralysis of the extremities or encephalitis, which offer only an unfavorable prognosis, may be avoided.

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● *If you wish to receive "Radiography and Clinical Photography" without charge, mail the coupon below.*

Radiographs Provide Diagnostic Facts

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Gentlemen: I should like to receive the free publication, "Radiography and Clinical Photography."

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Continued from page 24

Dr. A. R. Perry, formerly of Greenville, is now in charge of the Adams County Health Unit.

Dr. R. T. Smith, formerly of Natchez, has moved to Fort Smith, Arkansas.

Dr. H. C. McLeod, Hattiesburg, is the newly appointed division surgeon for the Illinois Central Railroad.

Dr. G. W. F. Rembert, Jackson, has been reelected to the Board of Governors of the College of Physicians for a term of three years.

Dr. Elwood Hunter Cox has moved from Eudora to Wilson, Arkansas.

Dr. M. B. Jernberg, formerly of Hollywood, has moved to Walls.

Dr. S. T. McIlwain, formerly of Waynesboro, has moved to Batesville and become associated with his son, Dr. A. J. McIlwain.

Dr. N. C. Knight, Indianola, has returned from Johns Hopkins, Baltimore, Maryland, where he has been taking postgraduate work in public health, and has resumed his duties as Health Officer of Sunflower County.

Dr. H. B. Cottrell, formerly of Indianola, who has been acting Health Officer of Sunflower County, has moved to Lucedale, where he will do some work for the State Board of Health.

Dr. F. M. Tindall has moved from Sunflower to Indianola.

Dr. J. K. Jones has located at Greenville, coming from Lepanto, Arkansas.

Dr. A. J. McIlwain, Batesville, and Miss Virginia McKinsey were married in June.

DEATHS

Dr. Alexander Roth Robertson, Pass Christian, aged 66, died April 28 of cerebral hemorrhage.

Dr. William H. Aikman, Natchez, aged 74, died June 30 of nephritis, chronic encephalitis and Parkinson's disease.

Dr. John Edward Pope, Zama, aged 49, died April 1.

Dr. Richard Rupert Stockard, Columbus, aged 84, died July 21 in Virginia of myocarditis.

Dr. Andrew G. Payne, Greenville, aged 65, died July 31 of heart disease.

Dr. Joseph William Stringer, Taylorsville, aged 61, died June 24 of cerebral hemorrhage.

MISSOURI

The Missouri Public Health Association and the Missouri Tuberculosis Association met in St. Louis in September, turning their respective annual meetings into a joint session.

Dr. George A. Johns, St. Louis, Superintendent of the City Sanitarium, has been appointed to succeed Dr. James L. Lewald as Superintendent of the St. Louis Training School for the Feeble Minded.

Dr. James L. Lewald, St. Louis, has resigned as Superintendent of the St. Louis Training School for the Feeble Minded to become Superintendent of the District Training School at Laurel, Maryland, a Federal institution for feeble minded.

The Six County Medical Group sponsored an all-day scientific meeting at Poplar Bluff in September, the program being furnished by the Missouri Tuberculosis Association, the Missouri State Board of Health, and the Postgraduate Committee of the Missouri State Medical Association.

Dr. W. L. Brandon, Poplar Bluff, has been appointed to fill the unexpired term of Dr. W. A. Clark, deceased, as a member of the State Board of Health.

Dr. Harold D. Chope, St. Louis, has resigned as City Epidemiologist to become Assistant Director of the California State Department of Health.

Dr. Hal E. Freeman, Willard, and Miss Mildred Irene Real were married in June.

DEATHS

Dr. Robert J. Woods, Smithville, aged 60, died May 4 of heart disease.

Continued on page 28

MAINTAIN MINERAL ALKALI BALANCE WITH KALAK

Hypertonic — Alkaline — Carbonated — Not Laxative

The years of experience with physicians who have used Kalak show that the use of a formula containing calcium, magnesium, sodium and potassium salts represents a correctly balanced solution. This is Kalak which, as such, aids in maintaining a balanced base reserve.

How Alkaline Is Kalak?

One liter of Kalak requires more than 700 cc. N/10 HCl for neutralization of bases present as bicarbonates. Kalak is capable of neutralizing approximately three-quarters its volume of decinormal hydrochloric acid.

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AGREEABLE TASTE

Smaco Carotene-in-Oil (formerly called Caritol) is easy to take because it contains carotene—the tasteless, fruit and vegetable, Pro-Vitamin A. There is no fishy taste and no disagreeable after-taste.

FRUIT and VEGETABLE PRO-VITAMIN A

Smaco Carotene-in-Oil (see illustration) is a solution of carotene which is the plant source of all vitamin A activity and is commonly referred to as the precursor of vitamin A or Pro-Vitamin A. Smaco Carotene-in-Oil is easily identified by its green-and-white package.

FOR VITAMIN A and D EFFECT, TOGETHER

Smaco Carotene-with-Vitamin-D-Concentrate-in-Oil (not illustrated) supplies both Vitamin A and D effect in *small bulk* and *palatable form*. Formerly called Caritol-with-Vitamin D, it combines the advantages of Carotene (Pro-Vitamin A) with Vitamin D concentrate prepared for therapeutic use by a process developed in the laboratories of and controlled by Columbia University. Pink-and-white package.

ACCEPTED AMERICAN MEDICAL ASSN.

CAROTENE—the Fruit and Vegetable Pro-Vitamin A

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An antigen of the Shwartzman type combined with a vaccine for intravenous use in the treatment of Chronic Infectious Arthritis.

The Wyatt Clinic

RESEARCH LABORATORIES

Tucson, Arizona

Continued from page 26

Dr. St. Clair Street, Kansas City, aged 75, died June 27 of arteriosclerosis and cerebral hemorrhage.

Dr. Mark Hugh Hudgins, Caruthersville, aged 69, died May 13.

Dr. Theodore L. Carriere, St. Louis, aged 62, died June 21 of heart disease.

Dr. Amos D. Gray, Chillicothe, aged 69, died in February of carcinoma of the stomach.

Dr. Leonidas T. Brown, Kansas City, aged 64, died January 28 of cerebral hemorrhage.

Dr. Frank J. A. Minnich, St. Louis, aged 83, died June 28 of chronic myocarditis and cerebral hemorrhage.

Dr. L. E. Miller, Stanberry, aged 69, died May 30.

Dr. Richard Calvin McClure, Kansas City, aged 62, died May 19 of hypostatic pneumonia and Parkinson's disease.

Dr. William N. Howard, Cape Girardeau, aged 71, died July 29.

Dr. Michael Timothy Collins, Sedalia, aged 76, died July 20 of cerebral hemorrhage.

Dr. James Daniel Marion Black, South Fork, aged 72, died May 14.

Dr. H. Allen Booth, Pacific, aged 77, died July 26 of uremia and arteriosclerosis.

Dr. Christian Heidemann, St. Louis, aged 63, died suddenly June 15.

NORTH CAROLINA

Duke Hospital at Durham announces a postgraduate course on fractures to be given at the hospital October 12 and 13.

The Third District Medical Society met at Southport recently and elected the following officers for the coming year: Dr. W. C. Dosher, Southport, President; Dr. W. C. Mebane, Jr., Wilmington, Vice-President; and Dr. Donald Koonce, Wilmington, reelected Secretary.

Dr. D. F. Milam, formerly with the State Health Department at Raleigh, has been transferred to Panama by the International Health Board of the Rockefeller Foundation.

Dr. Joseph C. Knox, Raleigh, formerly Assistant Epidemiologist

Continued on page 30

Phyllicin

the new theophylline salt

Phyllicin is a potent diuretic and cardiac stimulant in doses of 1 tablet two to four times a day, after meals. Prescribe Phyllicin to relieve cardiac distress and reduce edema of cardiac or nephritic origin ...

In 4 grain Tablets and as a Powder

Literature and samples upon request

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Milk Modifier

Produced by an infusion of Wheat Flour, Wheat Bran and Malted Barley admixed with Potassium Bicarbonate —consisting essentially of Maltose, Dextrins, Proteins and Mineral Salts.

Well babies take their food eagerly, sleep ten to twelve hours during the night with a nap during the day. If sleeping and eating habits are established from birth they have happy dispositions.

Thousands of physicians use Mellin's Food in feeding well babies because they have observed that babies fed on milk properly modified with Mellin's Food utilize their food well, have soft, smooth, homogeneous stools and gain steadily in weight.

Today the world-wide use of Mellin's Food by physicians is based upon its proven record of value and its use is consistent with today's sound pediatric knowledge and practice.

Successful infant feeding depends on the physician's ability to prescribe a food mixture readily taken, digested without difficulty and furnishing elements essential for normal growth and development. This is the purpose of every physician. Mellin's Food, so favorably known throughout the world, can be used to advantage in adapting the food to the needs of the individual infant.

Mellin's Food Company - - - Boston, Mass.

Directions for using Mellin's Food are left entirely to the physician.

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en route to the
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Convention at
San Antonio, Nov. 13-16

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NEW ORLEANS LIMITED
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NITROUS OXID
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CARBON DIOXID-OXYGEN MIXTURES

Oxygen Tents, Inhaling Outfits, Nasal Catheter Equipment, Etc.

Equipment Rental Service

Puritan Compressed Gas Corp.

Kansas City, Mo. Chicago, Ill. Baltimore, Md.
Cambridge, Mass. Cincinnati, Ohio Detroit, Mich.
St. Louis, Mo. St. Paul, Minn.
Dallas, Texas

Continued from page 28

of the State Board of Health, has been appointed Epidemiologist to succeed Dr. Milam.

Dr. Robert E. Fox, Asheville, formerly Health Officer of Buncombe County, is the newly appointed Assistant Director of county health work.

Dr. Zack P. Mitchell, Weldon, is the newly elected Health Officer of Vance County.

Dr. Carroll B. Robertson has located at Jackson since completing his internship.

Dr. Hight C. Warwick has located at Greensboro for general practice and will be associated with Dr. C. M. Gilmore and Dr. P. A. Shelburne.

Dr. Paul F. Whitaker, Kinston, has associated with him in the practice of diagnosis, internal medicine and clinical allergy Dr. Kilby Turrentine.

Dr. William Highsmith, Fayetteville, and Miss Margaret Parker Bridger were married July 25.

Dr. J. Frank Highsmith, Fayetteville, and Miss Cornelia McIntyre were married July 25.

Dr. W. L. Woodard, New Bern, and Miss Elizabeth Bulla were married July 14.

Dr. Alfred Abraham Kent, Jr., Granite Falls, and Miss Lena Evelyn Hellen were married July 19.

Dr. Charles Edgar Ballard, Belmont, and Miss Marie Almeda Wyatt were married in June.

Dr. Alexander H. Stevens, Jr., Farmville, and Miss Vera Naomi Bowen were married July 8.

DEATHS

Dr. William G. Shaw, Wagram, aged 66, died June 11.

Dr. Rolland Tyson Winstead, Rocky Mount, aged 44, died May 28.

Dr. Louis N. Burleson, Cabarrus, aged 66, died June 24 of pneumonia.

Dr. Charles Deems Bell, Wilmington, aged 76, died June 17 of coronary thrombosis.

Dr. Preston Charles Jenkins, Roxobel, aged 84, died July 5.

Dr. J. Mel Thompson, Graham, aged 46, died July 14.

OKLAHOMA

The Southeastern Oklahoma Medical Association met in Talihina in June and elected the following officers for the coming year: Dr. G. W. West, Eufaula, President; Dr. F. P. Baker, Talihina, Vice-President; and Dr. John A. Haynie, Durant, re-elected Secretary-Treasurer.

Dr. Omer H. Jones has moved to Kinta, coming from Vienna, Missouri.

Dr. J. T. Lowe, Mangum, is the newly appointed County Health Officer of Greer County.

Dr. L. W. Mattison has located at Ada, coming from Chicago, and has become associated with Dr. I. L. Cummings.

DEATHS

Dr. Robert Abraham Douglas, Tulsa, aged 67, died June 16 of angina pectoris.

Dr. William James Boyd, Oklahoma City, aged 73, died July 13 of cerebral hemorrhage.

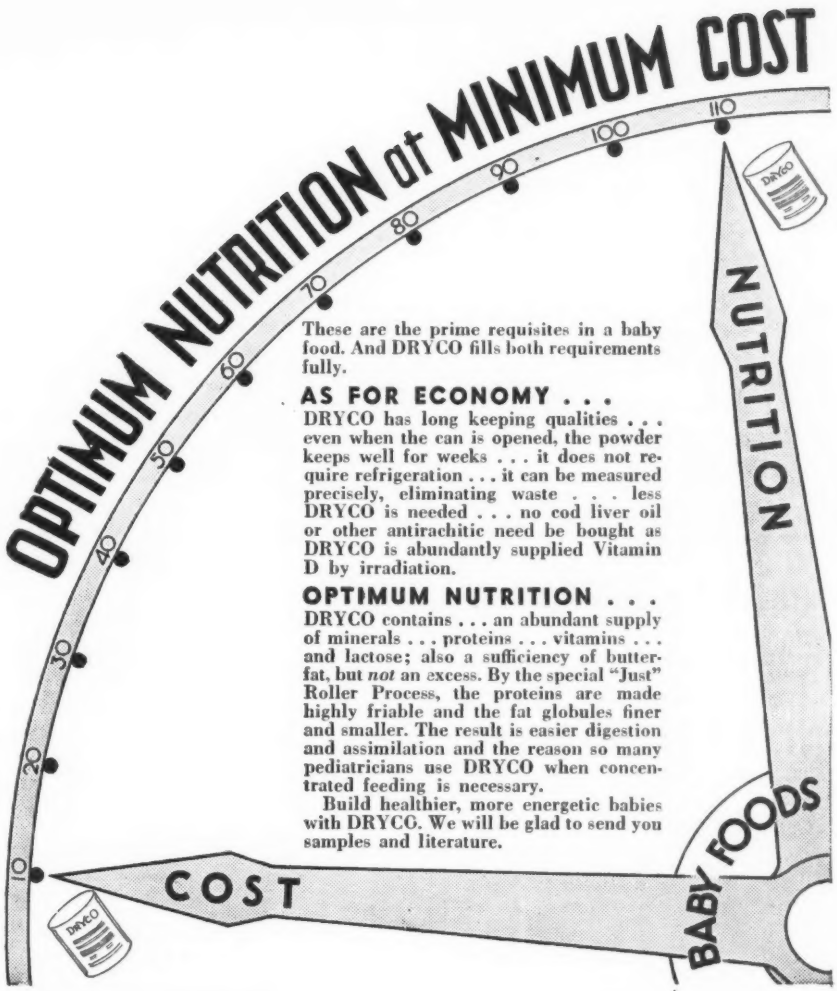
Dr. James Lambert Melvin, Guthrie, aged 78, died July 24 of toxemia as the result of prostatitis and cystitis.

Continued on page 32

Classified Advertisements

ALCOHOLISM (30 years' experience)—THE STOKES HOSPITAL, 923 Cherokee Road, Louisville, Kentucky. Telephone, East 1488. Absolute privacy. Treatment one of gradual reduction. Do not limit the quantity of whiskey used in treatment. Each patient treated as an individual case. Craving for alcoholic beverages destroyed; no physical injury incurred. Rates and folder on request.

ASSISTANCE OFFERED TO MEDICAL WRITERS. Research. Abstracts. Translations (all languages). Papers prepared from author's data. Ten years' experience with leading physicians and appointments on medical journals of highest standing. I employ no assistants; all my work is done personally and is reliable. Florence Annan Carpenter, 413 St. James Place, Chicago, Ill.



These are the prime requisites in a baby food. And DRYCO fills both requirements fully.

AS FOR ECONOMY . . .

DRYCO has long keeping qualities . . . even when the can is opened, the powder keeps well for weeks . . . it does not require refrigeration . . . it can be measured precisely, eliminating waste . . . less DRYCO is needed . . . no cod liver oil or other antirachitic need be bought as DRYCO is abundantly supplied Vitamin D by irradiation.

OPTIMUM NUTRITION . . .

DRYCO contains . . . an abundant supply of minerals . . . proteins . . . vitamins . . . and lactose; also a sufficiency of butterfat, but *not* an excess. By the special "Just" Roller Process, the proteins are made highly friable and the fat globules finer and smaller. The result is easier digestion and assimilation and the reason so many pediatricians use DRYCO when concentrated feeding is necessary.

Build healthier, more energetic babies with DRYCO. We will be glad to send you samples and literature.

DRYCO

A routine food for the *NORMAL*, the *CONVALESCENT* or the *SICK* baby

ACCEPTED AMERICAN MEDICAL ASSOCIATION

Made from superior quality milk from which part of the butterfat has been removed, irradiated by the ultra-violet ray, under license by the Wisconsin Alumni Research Foundation (U. S. Pat. No. 1,680,818) and then dried by the "Just" Roller Process.

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SOUTHERN MEDICAL ASSOCIATION
San Antonio—Nov. 13-16, 1934

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See the Old and New South
Go one Route—Return Another

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Binder and Abdominal Supporter

Gives perfect uplift and is worn with comfort. Made of Cotton, Linen or Silk, washable as underwear.

Three distinct types of Storm Supporters — many variations of each type.

This Photo Shows Type "N"

STORM supporters are made for all conditions needing abdominal uplift. Ptosis, Hernia, Pregnancy, Obesity, Relaxed Sacro-Iliac, Articulations, Kidney Conditions, Post-Operative Support, etc.

Each Belt Made to Order **Ask for Literature**

KATHERINE L. STORM, M.D.
Originator, Owner and Maker
1701 Diamond St. Philadelphia

Continued from page 30

Dr. Benjamin A. Owen, Perry, aged 59, died July 17 of carcinoma of the pancreas.

SOUTH CAROLINA

The State Department of Health, under the direction of Dr. James A. Hayne, State Health Officer, and Dr. Benjamin F. Wyman, Columbia, Director of Rural Sanitation, and assisted by Dr. Alvin E. Keller, Professor of Preventive Medicine and Public Health at Vanderbilt University Medical School, Nashville, Tennessee, has begun a hookworm survey and corrective campaign in the State.

Dr. C. E. Oxner, New Brookland, and Miss Albertine Smith were married recently.

Dr. Hiram Burnard Morgan, Inman, and Miss Georgia Marie Dunn were married in June.

Deaths

Dr. Archibald E. Baker, Charleston, aged 71, died July 31 of heart disease.

Dr. Thomas Boykin Clegg, Greenville, aged 37, died July 23 of drowning while fishing.

Dr. John Allen Hamer, Clio, aged 54, died July 11 of chronic nephritis.

Dr. Allen Jasper Harter, Allendale, aged 69, died June 27 of carcinoma of the throat.

Dr. Pinkney Venning Mikell, Columbia, aged 56, died July 31 of injuries received in an automobile accident.

Dr. Albert Golden Eaddy, Johnsonville, aged 56, died June 21 of cerebral hemorrhage.

Dr. J. W. Johnson, Kingsburg, aged 61, died June 29 of heart disease.

TENNESSEE

The Montgomery, Robertson, Cheatham, Stewart and Houston County Medical Societies met recently and organized a new group society to be known as the Black Patch Medical Society. Officers for the coming year are: Dr. M. L. Hughes, Clarksville, President; Dr. W. F. Fyke, Springfield, Vice-President; and Dr. W. S. Rude, Ridgetop, and Dr. Paul Wilson, Clarksville, Secretaries.

Dr. Russell B. Howard, Murfreesboro, is the newly appointed Health Officer of Carter County.

Dr. William H. McMillan, Erin, was given a dinner recently in honor of his seventy-fifth birthday.

Dr. Sidney W. Ballard, Nashville, announces the opening of offices in the Bennie-Dillon Building.

Dr. Seale Harris, Jr., Nashville, has been promoted to Associate Professor of Medicine at Vanderbilt University School of Medicine.

Dr. Roland M. Webster, Strawberry Plains, and Miss Clara Evelyn Brown were married June 9.

Deaths

Dr. Samuel S. Kittrell, Louisville, aged 66, died June 6 in a Knoxville hospital of otitis media and streptococcic septicemia.

Dr. Clarence Augustus Cobleigh, Chattanooga, aged 62, died June 15.

Dr. William A. Lockett, McEwen, aged 96, died June 11 of senility.

Dr. M. L. Johnson, West Point, aged 66, died March 29 of tuberculosis.

Dr. James Clifton Gantt, Pulaski, aged 53, died April 25 in a Nashville hospital.

Dr. Thomas Marion McGill, Robbins, aged 49, died June 6 in a Knoxville hospital of cirrhosis of the liver.

Dr. Horace Thea Fortner, Jellico, aged 34, died August 10 of drowning.

Dr. Gershon Campbell Bryant, Milam, aged 58, died July 22 of auricular fibrillation.

Dr. J. B. Core, Thompson Station, aged 64, died July 12.

TEXAS

Wichita Falls State Hospital has received an appropriation from the State Legislature to be used for enlarging the present hospital group by building an additional ward, with a possible capacity for housing 150 patients.

At the meeting of the Texas State Board of Medical Examiners in June one hundred and sixty applicants for licenses to practice in Texas were examined.

Continued on page 34

We quote from page 54 of

"The Milk Question"

by M. J. ROSENAU, Professor of Preventive Medicine and Hygiene, Harvard Medical School.

"Man has but a single stomach and this forms about twenty per cent of the digestive tract. The cow has four stomachs which form about seventy percent of the digestive tract. The calf's stomach is well fitted to handle and digest the tough, lumpy curds which form from cow's milk. Woman's milk curdles into a soft mass which is broken into numberless small particles. Evidently the stomach of the infant fed with cow's milk is over-taxed trying to break the tough curds into particles small enough for complete digestion. It is therefore evident that even if we could secure cow's milk, the chemical composition of which was exactly the same as that of human milk, it would still be far from a perfect substitute unless it behaved similarly in the digestive tract."

SIMILAC is similar to breast milk not only in composition but in digestive properties as well. Like breast milk it forms an extremely fine, soft curd of consistently zero curd tension.

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SIMILAC *is made from fresh skim milk (casein modified) with added lactose, salts, milk fat, and vegetable and cod liver oils.*

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San Antonio—Nov. 13-16

Low Round Trip Fares

En route, stopover and see New Orleans' famous French Quarter, the great hospitals and Tulane University's School of Medicine. Through Pullmans New Orleans to San Antonio—choice of two fast trains, "Sunset Limited" and "Sunset Mail"—through the heart of the far-famed Teche Country of Louisiana.

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An intensive two weeks' course in

INTERNAL MEDICINE

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Manhattan Eye Salve Co.

LOUISVILLE, KENTUCKY

Continued from page 32

Dr. Edwin G. Schwarz, Fort Worth, is the newly appointed Texas Chairman of the American Academy of Pediatrics.

Dr. J. Harvey Black, Dallas, is the newly elected President of the National Association for the Study of Allergy.

Dr. C. E. High, Wellington, recently took postgraduate work in Chicago.

The Bryan Hospital, recently reopened, announces the addition to the Hospital Staff of Dr. H. W. Cummings, Dr. S. J. Alexander and Dr. W. M. Boguskie, all of Hearne.

Dr. A. R. Ponton, Fort Worth, recently took postgraduate work at Rochester, Minnesota.

Dr. Craig Munter, Fort Worth, has been elected to membership in the American Urological Association.

Dr. John F. Ford, Dallas, has been studying plastic surgery in London during the summer.

Dr. Alvin L. Borchardt has moved from Lubbock to Vernon.

Dr. W. E. Frashuer has moved from Sinton to Robstown.

Dr. A. A. Matthews, formerly of Dallas, has moved to Versailles, Missouri.

Dr. John S. Peek has moved from Galveston to Brownsville.

Dr. John James Delany, Galveston, and Miss Jenneva Jaynes were married in June.

DEATHS

Dr. James Sterling Dimmitt, Sherman, aged 43, died June 26 of Hodgkin's disease.

Dr. George McDuffie Lackey, Staples, aged 66, died June 14.

Dr. Archie Cole, Pampa, aged 50, died June 21 of uremia.

Dr. Elisha Gregory, Mont Belvieu, aged 56, died April 9 of lober pneumonia.

Dr. James Jefferson Johnson, Sulphur Springs, aged 57, died March 3 of heart disease.

Dr. Benjamin C. Morgan, Fort Worth, aged 75, died January 31 of pernicious anemia.

Dr. Levi Y. Turner, Daingerfield, aged 74, died May 18 of heart disease.

Dr. Henry Allen Barr, Beaumont, aged 60, died July 12 of heart disease.

Dr. Jefferson Neal McKnight, Fort Worth, aged 82, died June 26 of heart disease.

Dr. John M. Johnson, Giddings, aged 64, died suddenly May 14 of heart disease.

Dr. James F. Barnwell, Johnson City, aged 59, died June 16 of carcinoma of the spine.

Dr. John G. Motley, Henderson, aged 71, died June 17.

Dr. Atticus Gwynn Blanton, Sonora, aged 52, died July 27 in an automobile accident.

Dr. W. T. Givens, Abernathy, aged 73, died June 14 of pneumonia.

VIRGINIA

The Augusta County Medical Society, at a recent meeting, elected the following officers for the coming year: Dr. C. P. Obenschain, President; Dr. W. A. Murphy, Dr. C. W. Rodgers, Dr. Chalmers Wills, Vice-Presidents; Dr. T. M. Parkins, Treasurer; and Dr. W. F. Hartman, Secretary; all of Staunton.

Dr. Harry G. Hudnall has located at Covington for practice since completing his fellowship at the Cleveland Clinic, and is associated with his father, Dr. B. Ryland Hudnall.

Dr. Clarence E. Arnette has located at Alexandria for general practice, with offices in the Barrett Building.

Dr. R. N. Hillsman, Jr., has located at Amherst for general practice.

Dr. Jethro M. Hurt has located at Blackstone for general practice.

Dr. W. W. Cleere, Hopewell, has been elected Chairman of the Board of Directors of the Prince George County Cotton Control Association, recently organized.

Dr. Joseph F. Phillips has located at Newport News for general practice.

Dr. C. B. White, Halifax, is the newly appointed part-time Health Officer for Halifax County, succeeding Dr. S. D. Gardner, who has resigned and is serving as camp surgeon at a CCC Camp at Wilderness.

Dr. James T. Jackson, formerly of Ashburn, has moved to Washington, District of Columbia, where he will serve as Chief Resident in Surgery at Garfield Memorial Hospital.

Dr. Prosser Harrison Picot, Richmond, announces the opening of offices in the Professional Building for the practice of obstetrics and gynecology.

Continued on page 36

THIS YOUNG MOTHER IS ABOUT TO MAKE A MISTAKE

MOTHER:
And please send me half a dozen tall cans of evaporated milk.
GROCER:
Certainly. What brand?
MOTHER:
Oh, no particular kind, I guess. Any brand will do.

THIS mother went to her doctor to get an infant feeding formula. The doctor wrote the formula—using evaporated milk as the chief ingredient—and sent the mother on her way with a friendly warning—"Follow these instructions to the letter!"

But . . . those instructions were just *seven letters* short!

Seven letters, B-O-R-D-E-N-S.

To the physician, the name Borden has so long been synonymous with pure, high quality evaporated milk that he is likely to take it for granted that all mothers would choose as he would. How much better it is to make this wise choice a certainty! One word—Borden's—in the infant feeding formulas you write will make sure that your little patients get an evaporated milk that measures up to your highest professional standards.

ACCEPTED AMERICAN MEDICAL ASSN. Committee on Foods

BORDEN'S EVAPORATED MILK was the first evaporated milk for infant feeding to be submitted to the American Medical Association Committee on Foods, and the first to receive the seal of acceptance. No formulas are given to the laity . . . Free to physicians—full-sized cans of Borden's Evaporated Milk. Just write to The Borden Company, Dept. SN 104, 350 Madison Ave., New York, N. Y.

Borden's NRA

EVAPORATED MILK

In Digestive Disturbances
Notably Ulcers

Horlick's Malted Milk offers a bland and soothing diet in dyspepsia, gastric and intestinal catarrh and ulceration of the stomach and duodenum. It is practically free from insoluble residue. During manufacture the fat is thoroughly emulsified, and all the starch of the grain is completely hydrolyzed to maltose and dextrin.

Horlick's Malted Milk, made with either milk or water, is an alkaline food, which is accordingly beneficial in an alkaline diet.

(In ulcer cases, the Tablets are a special convenience, since a flask may be carried in the pocket, offering suitable nourishment at the required intervals.)

Send for samples and new booklet "Dietary Uses of a Valuable Food"

HORLICK'S MALTED MILK CORP.
Racine, Wis.

Continued from page 34

Dr. William B. Carpenter has located at New Hope for general practice.

Dr. Norman E. Tylar, formerly of Petersburg, has located at Hopewell and become associated with Dr. D. Lane Elder, succeeding in this association Dr. Albert T. Brickhouse, who has become Camp Physician at the CCC Camp at Cape Henry.

Dr. J. L. DeCormis, Accomac, has been reappointed a member of the Accomac County School Electoral Board, whose function is the appointment of school trustees.

Dr. Herbert C. Jones, Petersburg, is the newly appointed Assistant City Coroner, working with Dr. E. L. McGill as Coroner.

Dr. R. Angus Nichols, Sr., and Miss May Carmichael, both of Richmond, were married August 15.

Dr. Booker Lee and Miss Nellie Estelle Lindsay, both of Pulaski, were married in June.

Dr. Charles Lorraine Cabell and Miss Elizabeth DeVega Danford, both of University, were married July 28.

DEATHS

Dr. Robert Lee Wilkins, Alexandria, aged 68, died June 10 of septicemia.

Dr. Warren Brown Hill, Mount, aged 72, died May 13 of carcinoma of the neck, chest and abdomen.

WEST VIRGINIA

The Brooke County Medical Society, at a recent meeting, elected the following officers for the coming year: Dr. B. F. Harden, President; and Dr. Ray C. Otte, reelected Secretary-Treasurer; both of Wellsburg.

Dr. G. W. Skaggs, formerly of Princeton, has moved to Dublin, Virginia, to practice.

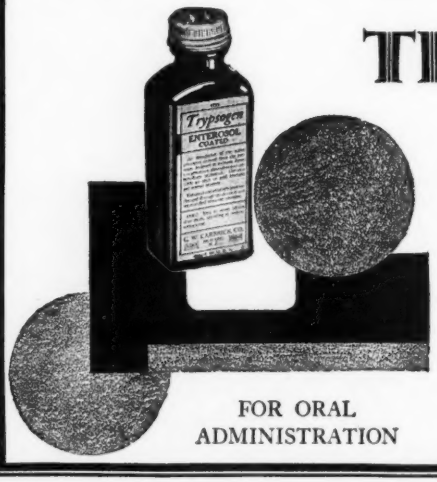
Dr. Thomas A. Lamb, formerly of Montgomery, has moved to Loudon County, Virginia, to practice.

DEATHS

Dr. Benjamin C. Harris, Lobata, aged 55, died July 12 of heart disease.

Dr. Francis T. Ridley, Bluefield, aged 52, died July 20 of heart disease.

A COMBINATION of all of the active derivatives of the pancreas which control carbohydrate metabolism together with the specific proteins necessary for regeneration of the pancreatic tissues.



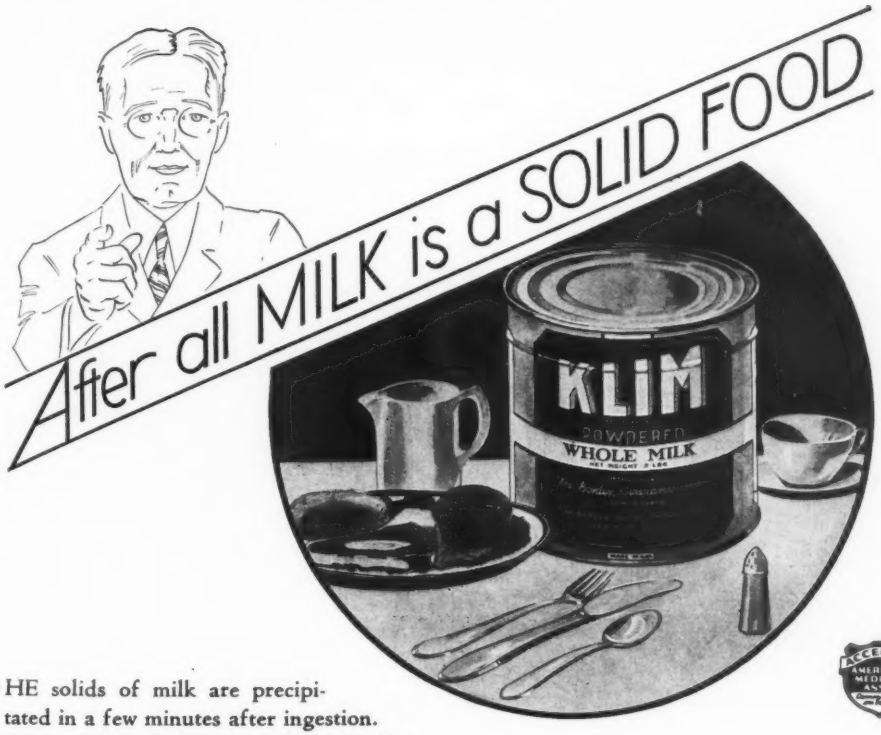
FOR ORAL ADMINISTRATION

TRYPSOGEN

Supplied with Enterosol Coating to insure the passage through the stomach for immediate absorption in the intestine.

Bottles of 100, 500 and 1000 tablets. Plain or Enterosol Coated.

G. W. Carnrick Co.
20 Mt. Pleasant Ave. Newark, N. J.



THE solids of milk are precipitated in a few minutes after ingestion. Actually, it is one of the most solid of foods. Why, therefore, satiate an unwilling appetite with the seven-eighths of milk that is water?

KLIM, powdered whole milk, contains in one ounce the caloric value of a full 8 ounce glass of milk. And, besides its minimum bulk, KLIM's soft, friable curd makes it doubly valuable in any difficult feeding case.

Below is a recipe from the KLIM cook-book (Reinforced Diet Recipes), using the concentrated butterfat, mineral, lactose, protein and vitamin content of KLIM. Write for as many of these practical helpful booklets as you may need for patient distribution. You will also receive samples of KLIM.

A Typical Recipe from *"Reinforced Diet Recipes"*

Potatoes to make 2 cups when mashed
2 tablespoons butter
½ cup hot water
1 teaspoon salt
¼ teaspoon pepper
5 teaspoons KLIM

MASHED POTATOES

To mash potatoes add the butter and the hot water. Beat until butter is melted. Add salt and pepper. Then add the KLIM a tablespoon at a time. Beat until fluffy.

Volume: 2¼ cups.

This recipe furnishes ⅞ cup of milk (154 calories) over normal recipes.

Give KLIM to those youngsters troubled with anorexia or to those unable to ingest the needed volume of milk. You'll build vital, healthy boys and girls.

KLIM

THE BORDEN COMPANY, Dept. 203, 350 MADISON AVENUE, NEW YORK, N. Y.

This mother registers surprise while the gas meter registers 540 cubic feet of gas per month for the cereal she cooks one hour every day. Cereals ordinarily require from one to three hours' cooking for infants. Pablum (Mead's Cereal pre-cooked) requires no cooking and saves this expense. The mother need only add water or milk (of any temperature) to serve Pablum for the baby and the other members of the household.

PABLUM

(Wheatmeal, oatmeal, cornmeal, wheat embryo, alfalfa leaf, and beef bone. Supplies vitamins A, B, E, and G and calcium, phosphorus, iron, copper, and other essential minerals.)

SAVES GAS

Your own wife can verify that when cereal is cooked one hour, 18 cubic feet of gas are consumed daily or 540 feet monthly. According to the rate prevailing in your community, you can figure it out for yourself how much this increases your gas bill every month.

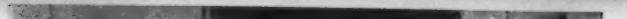
Another reason Pablum is more economical than ordinary cooked cereal is that no allowance must be made "for the pot." The mother can prepare the *exact amount* required. If the child clamors for more Pablum, which frequently happens because of its delicious flavor when properly prepared, another serving of this hot-or-cold cereal can be prepared in less than a minute.

The above economic factors are in addition to the important advantage that because of its quick preparation, the mother is not compelled to arise an hour earlier in the morning to cook cereal over a hot stove. Instead, she can obtain the extra rest which is so necessary for her health after confinement and during nursing.

Pablum, moreover, is rich in minerals and vitamins, is base-forming and nutritious.

MEAD JOHNSON & CO., Evansville, Ind.

Please enclose professional card when requesting samples of Mead Johnson products to cooperate in preventing their reaching unauthorized persons



DEXTRI-MALTOSE, over 23 years, Carbohydrate of Choice

1911

"The limits of assimilation of the different sugars vary and are as follows:

"Grape sugar: In babies, about 5 grams per kilogram (Langstein and Meyer).

"Grape sugar: In one-month baby, 8.6 grams per kilogram (Greenfield).

"Galactose: No accurate data.

"Levulose: (Lower for babies than adults.) One gram per kilogram (Keller).

"Maltose: Over 7.7 grams per kilogram (Reuss).

"Lactose: 3.1-3.6 grams per kilogram (Grosz).

"Cane sugar: Probably about the same as lactose (Reuss)."— *J. L. Morse, and F. B. Talbot: Physiology and pathology of the digestion of the carbohydrates in infancy, Boston M. & S. J., 164:852-855, June 15, 1911.*

1912

"Maltose has for many years been considered one of the most valuable of infant foods in modifying milk formulas; but the German school in the last few years has called special attention to the value of this sugar as a substitute for milk and cane sugars in conditions of intestinal fermentation. It is more easily assimilated and more rapidly absorbed than lactose or saccharose and it may be taken therefore by the infant in larger quantities without producing sugar fermentation."

"Maltose is especially indicated in the feeding of very young and delicate infants, and in all cases where either milk or cane sugar has produced intestinal fermentation and sugar intoxication. In the feeding of maltose it has been found advisable to combine it with about equal parts of dextrin. In Germany, and later in this country, 'Soxhlet's Nahrzucker' (which contains maltose 52.44 per cent., dextrin 41.26 per cent., and sodium chlorid 2 per cent.) has been largely used. Mead's Dextri-Maltose (malt sugar), which contains about equal parts of dextrin and maltose, is a similar preparation which may be used instead of milk sugar or cane sugar for modifying milk mixtures."—*B. K. Rachford: Diseases of Children, D. Appleton & Co., New York, 1912, p. 125.*

1913

"It is well to start with one ounce (albumin milk, or albumin-buttermilk) to every pound of body-weight in the twenty-four hours, increasing gradually until two or three ounces to the pound of body-weight are being given. Then add sugar, preferably a malt sugar, about one-fourth of an ounce at a time to the twenty-four-hour quantity, until an ounce or an ounce and a half is being given."—*J. Foote: Principles of treatment in malnutrition and atrophy of infants, Interstate M. J., 20:1913, No. 6.*

1914

"Milk sugar and cane sugar may be used in infant feeding, but my preference is for malt sugar. Mead and Johnson put up a convenient preparation which they call Dextri-Maltose and which consists of maltose 51 per cent., dextrin 47 per cent., sodium chloride 2 per cent., and which has a food value of about 110 calories per ounce."—*J. A. Gannon: Whole milk dilutions in feeding normal infants, Washington Med. Annals, 13:38-43, Jan., 1914.*

1914

"Dextrin-maltose causes the greatest gain in weight, cane sugar less, and lactose produces the least gain."—*M. S. Reuben: Observations on milk station infants, Arch. Pediat., 31:176-196, March, 1914.*

1914

"A composite opinion of the sugars is in favor of dextri-maltose, milk sugar and cane sugar in the order named."—*R. A. Strong: Essentials of modern artificial feeding of infants, Lancet-Clinic, March, 14, 1914.*

1914

"Experiments show that sugars vary in their rate of absorption, some being assimilated rapidly, while others distribute their nutriment over a longer period. For example, maltose is most promptly assimilated, cane sugar next and milk sugar slowest."

"The condition in which dextri-maltose is particularly indicated is in acute attacks of vomiting, diarrhea and fever. It seems that recovery is more rapid and recurrence less likely to take place if dextri-maltose is substituted for milk sugar or cane sugar when these have been used, and the subsequent gain in weight is more rapid.

"In brief, I think it safe to say that pediatricians are relying less implicitly on milk sugar, but are inclined to split the sugar element, giving cane sugar a place of value, and dextri-maltose a decidedly prominent place, particularly in acute and difficult cases."—*W. D. Hoskins: Present tendencies in infant feeding, Indianapolis M. J., July, 1914.*

1915

"In the severe cases (of diarrhea) he (Benson) uses Finkelstein's casein milk with malt sugar. He also believes that dextri-maltose is to be preferred to milk sugar or any other sugar, as the infants gain more rapidly and digest more easily this form of sugar."—*R. A. Benson: Observations on 1,500 artificially-fed infants, Med. Century, Feb., 1915, p. 33; abst. Arch. Pediat., 32-556-557, July, 1915.*

1915

"Until very recently we have taken it for granted that milk sugar was the best, but now many consider that malt sugar is even better. However, the malt sugar is not used in its pure state, but in the form of extracts, as dextri-maltose."—*E. B. Lowry: Your Baby, Forbes & Co., Chicago, 1915, p. 162.*

1915

"Cane-sugar (saccharose), like most of the other disaccharids, is not absorbed as such, but must first be split by the invertase of the intestinal secretion into the two glucoses, dextrose and levulose, which are readily absorbable. Maltose (malt-sugar) occupies an exceptional position among the disaccharids, in being partly absorbable as such. This is probably due to the fact that it can be split not only by the maltase of the digestive juices, but also by the same ferment being present and active in the circulating blood (Chittenden and Mendel)."

"Anticipating a little, we may mention that all cases, in which lactose may advantageously be replaced by other carbohydrates, are pathological, and without exception the result of unsuccessful attempts at artificial feeding; they will therefore be discussed under that head.

"Dextrin, intermediate between sugar and starch, is physiologically nearer to the former; we shall have occasion to see that, under certain conditions, it may supplement sugar very advantageously. Given together with maltose, it materially delays the fermentation of the latter; Stolte observes that the more complex the carbohydrate the longer fermentation is postponed."

"All malted foods contain dextrin, and there is reason to believe that their value largely depends on their being somewhat complicated; such, at least, is the opinion of Usuki and Stolte, who believe that a mixture of carbohydrates is more slowly absorbed than a pure sugar, and therefore tends to check fermentation in the intestine. Southworth explains the matter more definitely, by attributing the antifermentative action entirely to the dextrin, which is not fermentable as such, but only after it has been split into maltose, a process that takes place only gradually, and in the later stages of digestion."

"I make it a rule to give the ordinary formula with dextrin-maltose whenever the usual milk or cane-sugar mixtures seem to cause excessive fermentation and colic, or are attended with the evacuation of soap stools. I decidedly prefer this, as a preliminary measure, to going over at once to some very low fat combination, which can only be a temporary makeshift at best. I also find dextrin-maltose an excellent addition to albumin-milk when the first object of that food has been achieved and a gain in weight is desired; in this way I have succeeded in feeding albumin-milk far beyond the period usually advised, with highly gratifying results."—*F. L. Wachenheim: Infant-Feeding; Its Principles and Practice, Lea & Febiger, Phila., 1915, pp. 31, 33, 146, 158.*

1915

"The infant with diarrhea and vomiting is given nothing but tea for from twelve to twenty-four hours, no longer, and then the albumin milk is commenced, not over 5 gm. ten times a day, with 3 per cent. of a maltose-dextrin mixture. The amount of albumin milk is increased by 50 gm. each day until the daily ration totals 300 gm. After the weight has become stationary, carbohydrates can be added up to 5 per cent. of the maltose-dextrin mixture."

"Albumin milk is not so uniformly effectual in dysenteriform diarrhea as in cholera infantum. Whey seems to act better, diluted half and half with oatmeal gruel. After the starvation period he gives 50 gm. of the whey and increases by 50 gm. daily with equal amounts of oatmeal gruel. As improvement sets in 3 per cent. of a dextrin-maltose preparation can be added."—*L. Langstein: Cholera infantum and other severe diarrheas in infants, Therap. Monatsh., V. 29, August, 1915; Abst. J.A.M.A., 65:1314, Oct., 7, 1915.*

1916

"Dextri-maltose, having a higher absorption tolerance than the other sugars, is less likely to cause intestinal disturbances when large amounts of it are given."—*H. R. Mixsell: A brief résumé of the role of carbohydrates in infant feeding, Arch. Pediat., 33:31-36, Jan., 1916.*

1916

In cases of malnutrition, and indigestion in infancy, "The appetite improves rapidly, and the stools soon become normal in appearance, if the sugars are intelligently prescribed. By this I refer to proper proportions of dextrin and maltose. When there is a tendency to looseness, I have used the preparation known as 'dextri-maltose,' for the extra carbohydrates; . . ."—*M. Ladd: Further experience with homogenized olive oil mixtures, Arch. Pediat., 33:501-513, July, 1916.*

Continued down to 1934

MEAD JOHNSON & COMPANY, Evansville, Indiana, U.S.A.

Please enclose professional card when requesting samples of Mead Johnson products to cooperate in preventing their reaching unauthorized persons

One of a series of advertisements prepared and published by PARKE, DAVIS & CO. in behalf of the medical profession. This "See Your Doctor" campaign is running in the *Saturday Evening Post* and other leading magazines.

YOU DON'T BELIEVE IN DOCTORS?

"I'M TOO BUSY to go to the doctor. And I haven't much faith in doctors anyway."

Every once in a while you hear a person make such a statement—perhaps you have yourself. Does it make sense? Let's see—let's look at life as it used to be and life as it is today . . .

A little over a century ago, smallpox was the rule rather than the rarity—in fact, a case is recorded in which a criminal was identified by the fact that his skin was unblemished by pockmarks!

Today, thanks to vaccination, smallpox has almost completely disappeared. A doctor discovered vaccination—every doctor now offers its protection.

UP until the middle of the 19th Century, a surgical operation was a horrible ordeal. The comforting oblivion of anesthesia was not known, and the lack of proper antiseptics made even the simplest operation an unequal gamble with death.

Today, surgery is so efficient, so advanced, so much a part of nearly everyone's experience, that we take even downright miracles as a matter of course.

TWELVE years ago, diabetes was a virtual sentence to death. *Today, doctors can give most diabetics a normal span of life.* Just a few years ago, pernicious anemia was hopeless. *Today, it can be fully controlled.*

Kidney disorders, childbirth, asthma, goiter—the terror of all of them has been lessened by miracles that modern medical science has wrought.

The discovery and application of vitamins have almost eliminated rickets and scurvy . . . and deserve much of the credit for the sturdy legs and healthy bodies of our children. Yet at the beginning of this Century, the word "vitamin" wasn't even in the dictionary.

Many diseases that were shrouded in mystery even as late as 30 years ago, are an open book to the doctor of today. Syphilis, whooping cough, scarlet fever—the causes of all have been discovered since 1900. And that means in most instances, also a method of control.

MEDICINE is a living thing, constantly growing, constantly developing, constantly moving forward. And the one person who can place this knowledge at your disposal is *your doctor.*

The men and women that comprise the medical profession spend years of preparation in learning to become doctors . . . and they keep in touch with medical progress through clinics, hospitals, medical societies, medical journals, medical conventions, and other agencies which help disseminate this precious knowledge.

It is a sensible thing to call upon your doctor frequently enough to *preserve* health as well as to *restore* health. Faith in your doctor, and intelligent recourse to the knowledge he offers, might mean the difference between a bed of pain and continued good health—between a premature death, and a pleasant and useful "threescore and ten."

PARKE, DAVIS & COMPANY
DETROIT, MICHIGAN

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